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REAUTHORIZATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

HEARING

BEFORE THE

SUBCOMMITTEE ON THE CONSUMER

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED SECOND CONGRESS

FIRST SESSION

ON

S. 1012

TO AUTHORIZE APPROPRIATIONS FOR THE ACTIVITIES AND PROGRAMS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, AND FOR OTHER PURPOSES

APRIL 11, 1991

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REAUTHORIZATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA)

THURSDAY, APRIL 11, 1991

U.S. SENATE,
SUBCOMMITTEE ON THE CONSUMER
OF THE COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 9 a.m., in room SR–253, Russell Senate Office Building, Hon. Richard H. Bryan (chairman of the subcommittee) presiding.

Staff members assigned to this hearing: Linda Lance and Moses Boyd, professional staff members; and Alan Maness, minority professional staff member.

OPENING STATEMENT BY SENATOR BRYAN

Senator BRYAN. I'd like to welcome everyone this morning to this hearing of the Consumer Subcommittee of the Senate Committee on Commerce, Science, and Transportation, on the reauthorization of the National Highway Traffic Safety Administration, or, as we know it, NHTSA.

This morning we will hear testimony about an agency with the responsibility that can be simply stated—to save lives. Obviously, nothing could be of greater importance or more deserving of our attention and our efforts.

NHTSA's primary responsibility is to improve the safety of our vehicles on our highways. Since the agency was created in 1966, considerable progress has been made. However, about 45,000 people a year are still killed on our Nation's highways, and motor vehicle-related injuries are the leading cause of death for children over the age of 1. Motor vehicle crashes cost the U.S. economy an estimated $74 billion each year.

Today we are in the early stages of preparing this legislation. We've asked our witnesses to help us in this regard. We hope to get their views on what highway safety priorities should be and how best to achieve those priorities.

We have circulated a working draft of our legislation to give our witnesses this morning something to comment on. I would note that this draft contains references to a broad range of issues under consideration by the committee in the area of highway safety. We will finalize the bill after reviewing the testimony received, as well

as any technical comments interested parties may wish to provide to the staff.

As everyone here is all too painfully aware, the effort to reauthorize NHTSA has been difficult, and is yet unsuccessful. This agency has been without an authorization since 1982, despite the fact the Senate has passed three separate bills during that time. In the last Congress, in March 1989, together with a number of my colleagues, I introduced S. 673. This committee approved, and the Senate passed, that bill in August of that year, but the bill was not enacted into law.

We will be considering many of the issues covered by S. 673 again this year. These issues include requirements that NHTSA complete rulemaking to improve the safety of passenger vehicles, including additional head injury protection, additional safety features like roof-crush resistance and rollover protection for multipurpose vehicles such as minivans and jeeps.

I'm pleased to note that there are some very important issues addressed in S. 673 that will not be in our new NHTSA authorization because the rulemakings that would have been required have already been accomplished by NHTSA. These issues include a side-impact protection standard for passenger cars and passive restraints for light trucks.

In addition to issues addressed in earlier legislation we will also be discussing some new issues that have evolved since S. 673 was first drafted, including required airbags and antilock brakes. We are interested to hear our witnesses' views of the potential of these and other lifesaving technologies.

Finally, we will address some of NHTSA's other responsibilities including incentive grants to States for highway safety and drunk driving prevention. Our goal is to develop the most effective and efficient programs in these areas within the funding constraints that exist.

Our witnesses represent an interesting and wide range of expertise and perspective on highway safety. Despite these differences, I believe that all parties working on highway safety share the common goal of saving lives and preventing injuries. I look forward to our work together toward this end. There is no more important work that this committee is undertaking. We are pleased this morning to have as our leadoff witness, as he has been on several of the other subcommittee hearings, the head of the agency, General Curry.

I have an opening statement from Senator Gorton that he would like to have included in the record.

OPENING STATEMENT BY SENATOR GORTON

Senator GORTON. Thank you, Mr. Chairman, for calling this important hearing.

In the last week, the tragic deaths of Senators Heinz and Tower have reminded the Senate of the importance of transportation safety. The most critical aspect of transportation safety is highway safety. Over 94 percent of those killed in transportation accidents die in highway crashes. If current trends continue over the next 10 years, these crashes will kill 450,000 Americans, force the hospital-

ization of over 5 million of our citizens, and cost our country more than $750 billion.

Since 1982, this committee and the Senate have repeatedly passed legislation to reauthorize the Nation's leading safety agency—the National Highway Traffic Safety Administration. During this period, our efforts have helped to move NHTSA forward on several important issues, including side-impact protection for passenger cars and the application of the passive restraint rule to light trucks.

Much work remains to be done to improve passenger car and light truck safety. We must improve the safety of small trucks and minivans by making sure that they have basic safety protections as passenger cars, such as the side-impact protection standard. We must ensure that vehicles have sufficient stability so that they are not prone to roll over.

NHTSA also has a mandate to help those who purchase vehicles under the Motor Vehicle Information and Cost Savings Act. One of NHTSA's responsibilities under this act is the establishment of minimum standards for bumpers. In 1982, NHTSA lowered its bumper standard from 5 to 2.5 mph. At the time, it promised to develop a rating system to inform consumers about the strength of automobile bumpers, but it never developed such a system.

We never should have allowed the bumper standard to be lowered. Each year the Insurance Institute for Highway Safety—IIHS—conducts crash tests with bumpers. Several of the 1991 cars IIHS tested at 5 mph had damages of over $3,000. The 2.5-mph standard is unacceptable. With the ever increasing cost of automobile insurance and higher deductible levels, car owners cannot afford to drive vehicles equipped with tissue paper bumpers that offer no protection from low speed collisions.

We should address the bumper issue in two ways. First, it is time to return to its 1982 5-mph bumper standard. Second, automakers should inform consumers of the maximum speed at which a vehicle's bumper can prevent damage to the vehicle.

Mr. Chairman, I look forward to this hearing as an opportunity to develop legislation that can reduce highway deaths and injuries.

Senator BRYAN. Welcome, it's nice to have you with us, and I know you have a complete statement, which I am sure all of us have had a chance to read. We will include that as part of the record and defer to you now for any comments you might care to make.

STATEMENT OF JERRY RALPH CURRY, ADMINISTRATOR, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION; ACCOMPANIED BY BARRY FELRICE, ASSOCIATE ADMINISTRATOR FOR RULEMAKING; BILL BOEHLY, ASSOCIATE ADMINISTRATOR FOR ENFORCEMENT; ADELE DERBY, ASSOCIATE ADMINISTRATOR FOR TRAFFIC SAFETY PROGRAMS; GEORGE PARKER, ASSOCIATE ADMINISTRATOR FOR RESEARCH AND DEVELOPMENT; AND DON BISCHOFF, ASSOCIATE ADMINISTRATOR FOR PLANS AND POLICY

Mr. CURRY. Thank you, sir.

Mr. Chairman, before I begin, let me mention that this agency would certainly like to express its sorrow for the untimely deaths

of Senator Heinz and Senator Tower, and we have taken note of that and recognize it's quite a blow to the U.S. Senate.

It is a pleasure to appear before you today to testify on motor vehicle and highway safety and the activities of NHTSA. With me at the table are Barry Felrice,; my Associate Administrator for Rulemaking. Bill Boehly, who has become Associate Administrator for Enforcement. Certainly, Adele Derby you know, who is in charge of our traffic safety programs. To my immediate right we have George Parker, who runs research and development, and Don Bischoff who is in charge of plans and policy.

Senator BRYAN. Welcome to the committee.

Mr. CURRY. Motor vehicles give us extraordinary mobility, but their benefits are not without costs. Each year motor vehicle crashes cost America $74 billion in economic losses. But beyond that, the true currency of crashes is tragedy. Every day more than 120 American families assemble at gravesites somewhere in America to mourn the loss of a family member killed in a crash—and frequently a young family member.

NHTSA's basic statutory mandate is to reduce the human and economic costs of these motor vehicle crashes, as well as the deaths and injuries. And we do this by conducting research to improve motor vehicle and highway safety, determining specific motor vehicle and highway safety problems that need to be addressed, setting standards, putting into effect programs to address these problems, and evaluating the results of our efforts.

As you know, and have pointed out, highway fatalities have declined from 47,100 in 1988 to 44,500 estimated in 1990. Talking about motor vehicle safety and Federal regulation, in 1990 we issued 94 rulemaking notices, more than in any other year in the agency's history, far exceeding the annual averages of 62 in the Carter administration, and 72 during the Reagan years. And, we have issued an additional 37 in the first 3 months of 1991—again, at a record pace. I'm pleased to say that about 80 percent of these notices, including ones that denied or terminated rulemaking actions, imposed no new regulatory burdens. Most of these were requests for information or clarification of existing rules, permission for new technology, eliminations of barriers to innovation, information to the public on various matters, and actions to allow manufacturers increased flexibility to comply with existing rules.

Now, besides processing more rulemakings, we process them faster. The average completion time has moved from 24 down to 21 months.

These accomplishments must include a host of significant advances such as passive restraints for light trucks and the new side-impact rule for passenger cars. These two represent the most important advances in motor vehicle safety since the Department's 1984 requirement for automatic crash protection. We also issued a series of regulations requiring that light trucks and vans meet safety standards equivalent to those of passenger cars, and I have two to announce at the end of my statement.

Recently I testified before this subcommittee on airbags and, at that time, discussed our final rule extending the automatic crash protection requirements to light trucks. I will not mention that further today unless you have a question.

School buses, our safest type of motor vehicle, carry millions of our children each day, and no cargo is more precious. The school bus safety regulations are part of a continuing process to ensure the highest degree of protection for schoolchildren.

Also in the area of child safety we announced in February a proposed new registration rule requiring child safety-seat manufacturers to provide postage paid registration cards with each new seat so owners can be notified directly in the event of a safety recall.

You have mentioned the changes in S. 673, and I will not mention anything more unless you have questions as we go through this.

Let me turn to enforcement. In our enforcement program we seek to ensure that any safety defects or failures to comply with our standards are quickly detected and remedied. The enforcement program is critical if we are to ensure that the drivers and occupants of motor vehicles are not exposed to an unreasonable risk of injury.

There were 141 safety defect vehicle recall campaigns in 1990 involving some 4.3 million vehicles. Our 65 recall campaigns for noncompliances with safety standards involved another 1.7 million vehicles. Three-quarters of the total vehicles recalled were influenced by NHTSA investigations. We opened 256 investigations involving defects or noncompliances with standards.

And, as you know, we begin most of our investigations because of the owner complaints, many of which come to our toll-free auto safety hotline. The number is 800–424–9393. In 1990 we increased the telephone capacity of the hotline by adding 10 lines, or about one-third more, for a total of 27. We handled 433,000 consumer calls in 1990, compared with 313,000 calls in 1989. In 1 year that's a 38-percent increase in consumer calls.

During the next 10 to 15 years, many new improvements in the safety of motor vehicles, such as airbags and antilock brakes, will become standard equipment on vehicles in the United States. But new safety features are the product of years of research and development. Introducing new safety improvements into the entire fleet thus requires long leadtime before full benefits are realized.

Our agenda in research and development consists of programs in five basic areas: crashworthiness; crash avoidance; highway safety; crash data collection and analysis; and technology transfer.

I should mention to you that the goal of our intelligent vehicle-highway systems program, which we conduct in concert with Federal Highways, Urban Mass Transportation, and the Research and Special Programs Administrations is to demonstrate that improved crash avoidance performance can be achieved. We are working on a national advanced driving simulator project. We have completed a technical/economic feasibility and conceptual design study, and we are doing some other work should the decision be made to support such a program, and that decision has yet not been made.

Our highway safety research focuses on the main cause of motor vehicle crashes, which is human error. In this area our main research efforts are in alcohol and drug-impaired driving, speeding, occupant protection, and pedestrian safety.

Of course, no review of highway safety would be complete without mentioning the leading factor in fatal and serious injuries,

which is drunk driving. To deal with that problem we are fully supportive of administrative license revocation.

We are certainly pushing very strongly this year for the use of safety belts and child restraints, another one of our priority programs. To achieve 70-percent national belt use by 1992, which is one of the administration's goals, this summer we begin the most intensive nationwide safety belt campaign ever devised in the United States. You might call it the "100 days of Summer." We talked about this at the last hearing. I don't intend to go deeply into that unless you have a question.

Last month, NHTSA and Federal Highways jointly issued a final rule providing guidelines to States for a uniform parking system for drivers with disabilities that limit or impair their ability to walk. We are very pleased that happened.

Last April NHTSA held a traffic safety summit in Chicago, the first of its kind ever. We had 200 leading State and local law enforcement officials who shared their views on how Federal, State, and local authorities can better address problems such as drunk and drugged driving, speeding, safety belt use, and commercial vehicle safety. Since then we have had an implementation group, comprised of summit officials, that has met with us to help keep us on track.

This coming June we will sponsor Traffic Safety Summit II in Orlando, FL, for members of the judicial and prosecutorial communities. The subject will be one of NHTSA's major highway safety goals—how to improve the prosecution and adjudication of traffic safety offenses. The results of Traffic Safety Summit II should help us to identify what we can do nationally to back up our highway safety enforcement programs at the State and local level.

Your letter of invitation mentioned the status of authorization legislation. S. 610, the "Surface Transportation Assistance Act of 1991," includes our proposed reauthorization of the highway safety program, together with that of the Motor Vehicle Safety and Cost Savings programs, for the next 5 years. It is based on the principles of the President's national transportation policy, developed with assistance of experts in both the public and private sectors.

Sir, that completes my remarks. I have two announcements on light trucks. The National Highway Traffic Safety Administration is pleased to announce today that all new light trucks and vans will be required to be equipped with a center high-mounted stop lamp by model year 1994, to reduce the number of rear-end collisions and resulting injuries. When all light trucks and vans are equipped with these lamps, between 65,000 and 90,000 rear-end collisions will be prevented each year, and that will save between $103 and $143 million in vehicle damage costs. The center high-mounted stop lamps are estimated to prevent about 19,200 to 27,400 injuries each year. The annual cost of implementing this requirement is about $58 million.

The center high-mounted stop lamp has proven its worth on passengers cars since model year 1986. The extra light is effective because it signals only one thing and that is that brakes have been applied. It cannot be confused with rear lights or turn signals. And the safety agency today is pleased to say that the new rule will apply to multipurpose passenger vehicles, including minivans and

sport utility vehicles, pickups, other trucks under 10,000 pounds, and small buses. There are many more details on this announcement, sir, that are available.

On the second one, we are also pleased to announce today that, beginning September 1, 1993, new light trucks and vans will be required to meet a roof-crush standard similar to that for passenger cars. Our safety standard No. 216, roof-crush resistance, is being extended to light trucks to reduce death and injury in rollover crashes. More than 3,150 light truck occupants were killed in these crashes last year. Increased sales and use of light trucks as passenger car substitutes have led to more people being exposed to crashes in these vehicles, and they should be assured the same protections as people riding in passenger cars as both you, Mr. Chairman, and Senator Danforth have pointed out many times.

The new final rule applies to utility vehicles, trucks, vans, and buses with a gross vehicle weight rating under 6,000 pounds. Under the regulation, the roof of a vehicle being tested will be subjected to a force one and one-half times the unloaded vehicle weight. A light truck passes the test if its roof crushes less than 5 inches.

Many manufacturers already provide substantial roof-crush protection in their light trucks and vans, so they will not have to do extensive work; but for others there will be such a requirement. The new roof crush standard is another step in our agency's ongoing initiative to improve safety for occupants of light trucks and vans.

Sir, that's a rather quick synopsis of our announcements, also and with that I will conclude my prepared remarks. We will take whatever your questions may be, sir.

[The prepared statement of Mr. Curry follows:]

PREPARED STATEMENT JERRY RALPH CURRY

Mr. Chairman and Members of the Subcommittee, it is a pleasure to appear before you today to testify on motor vehicle and highway safety, and the activities of the National Highway Traffic Safety Administration (NHTSA). With me at the witness table are Barry Felrice, Associate Administrator for Rulemaking, William Boehly, Associate Administrator for Enforcement, George Parker, Associate Administrator for Research and Development, Adele Derby, Associate Administrator for Traffic Safety Programs, and Don Bischoff, Associate Administrator for Plans and Policy.

Much has happened since I appeared before you at my nomination hearing in October 1989. Let me review our accomplishments and plans for the future and summarize our recent legislative proposals and authorization requests. We begin with the broad problems NHTSA is dealing with, our statutory and mission objectives, and the current traffic safety picture.

Motor vehicles give us extraordinary mobility, but their benefits are not without costs. Each year motor vehicle crashes cost America $74 billion in economic losses. But beyond that, the true currency of crashes is tragedy. Every day, more than 120 American families assemble at grave sites around the country to mourn the loss of a family member killed in a crash—frequently a young family member.

NHTSA's' basic statutory mandate is to reduce the human and economic costs of motor vehicle crashes and the deaths and injuries from these crashes. We do this by conducting research to improve motor vehicle and highway safety, determining specific motor vehicle and highway safety problems that need to be addressed, setting standards and putting into effect programs to address these problems, and evaluating the results of our efforts.

For the first time in the agency's history, a President has set specific mission objectives for NHTSA. In 1989, the President adopted these objectives:

- Reduce the death rate from motor vehicle crashes to 2.2 fatalities per 100 million vehicle miles traveled by 1992.

- Increase safety belt use to 70 percent of all motorists by 1992.
- Reduce drunk driving.

We have many programs and activities underway to achieve the President's objectives and, indeed, have already seen a reduction in the fatality rate to a 1990 record low of 2.1 deaths per 100 million vehicle-miles traveled—40 percent lower than the rate in 1980 when the fatality rate was 3.3 deaths per 100 million miles traveled. Approximately 151,000 more people would have died in traffic crashes from 1981 through the end of 1990 if the 1980 rates had remained constant.

Even more important, total highway fatalities have declined from 47,100 in 1988 to 45,500 in 1989, and to an estimated 44,500 in 1990. The decline in the total number of traffic deaths is even more impressive when annual increases in the number of drivers and vehicles are taken' into account.

Motor Vehicle Safety: NHTSA's authority under the National Traffic and Motor Vehicle Safety Act to issue motor vehicle safety standards continues to be our most systematic means of improving the safety of motor vehicles. We have been making significant progress in this area by doing more and doing it more quickly.

For example, in 1990 we issued 94 rulemaking notices, more than in any other year in the agency's history, far exceeding the annual averages of 62 in the Carter Administration and 72 during the Reagan years. And, we have issued an additional 37 in the first three months of 1991—again, a record pace. About 80 percent of these 1990 notices, including ones that denied or terminated rulemaking actions, imposed no new regulatory burdens. Most were requests for information, clarifications of existing rules, permission for new technology, eliminations of barriers to innovation, information to the public on various matters, and actions to allow manufacturers increased flexibility to comply with existing rules.

Besides processing more rulemakings, we have processed them faster, reducing our average completion time from 24 months in 1989 to less than 21 months in 1990. We expect to improve this further, as we strive to reach our goal of 18 months. Similarly, in responding to petitions for rulemaking from the public, we completed action on a record high of 89 petitions last year (compared to an average of 50 per year in the 1980s) and did it faster than ever—averaging under 4 months compared to the previous average of 8 months.

While many of our rulemaking actions support existing standards, the accomplishments noted above include a host of significant safety advances, such as the new side impact rule for passenger cars—the most important advance in motor vehicle safety since the Department's 1984 requirement for automatic crash protection. We also issued a series of regulations requiring that light trucks and vans meet safety standards equivalent to those for passenger cars, including final rules for automatic crash protection, head restraints, and rear seat lap/shoulder belts. We are very close to making decisions on final rules for these vehicles for roof crush resistance, side impact protection, and high-mounted stop lamps.

I recently testified before this Subcommittee on air bags and, at that time, discussed our final rule extending the automatic crash protection requirements to light trucks. I will not repeat that discussion, today. However, I do want to reemphasize how critical these systems are to our progress in vehicle safety in the 199Os. When these vehicles enter the U.S. fleet, we expect the effect of these systems on fatalities and serious injuries will be dramatic, saving as many as 2,000 additional lives each year.

In January of last year, we published our evaluation plan for automatic restraint systems. Three distinct types of automatic protection—air bags, 2-point automatic belts, and 3-point automatic belts—are currently in production. The primary purpose of the evaluation is to determine the costs, benefits, and performance of these systems. The evaluation plan 5consists of a series of data-gathering and analysis projects scheduled for 1990-1994. The first interim report will be completed this year.

School buses, our safest type of motor vehicle, carry millions of our youngsters' each day. No cargo is more precious. Our school bus safety regulations are part of a continuing process to ensure the highest degree of protection for school children.

The agency issued two notices of proposed rulemaking last month. One would require improvements in the strength of body joints; the other would require more emergency exits in full-size school buses. We are also nearing a decision on a final rule for stop arms and a notice of proposed rulemaking on mirrors. And, we are currently seeking comment on a report prepared for us on school bus flammability by the National Institute of Standards and Technology's Center for Fire Research.

Also in the area of child safety, we announced in February a proposed new registration rule requiring child safety-seat manufacturers to provide postage-paid registration cards with each new seat so owners can be notified directly in the event of a safety recall. This will ensure that manufacturers have a list of owners to contact

if the seat is later found to have a defect. In some recent recalls, we found that manufacturers had no direct way to contact owners of defective seats. It is our tentative view that owners will be more likely to have recall work performed if they receive a personal notification from a manufacturer, as they do with motor vehicle recalls. To encourage public discussion of our registration proposal and to promote State and local child safety seat programs, we are sponsoring a National Conference on Child Passenger Safety this May.

We are also in the final stages of preparing rules for two new test dummies to be.included in our child restraint standard. These will be considered to expand the evaluation of child restraint systems. Other activities are underway to upgrade the child restraint standard, including efforts to assess the safety performance of booster seats.

As a follow-up to the President's management objectives for NHTSA and the Secretary's National Transportation Policy Statement, Moving America, we published a more specific set of priorities in Moving America Safely, NHTSA's Priority Plan for 1990-1992. In that document and its recent update to include 1993, you will see that this agency is currently engaged in a number of vital regulatory subjects, including decisions on light duty vehicle handling and stability (rollover), frontal and side impact head protection, and anti lock brakes and improved conspicuity and rear underride guards for heavy trucks—just to name a few.

Other areas, such as improved frontal crash protection and pedestrian safety, are also being considered for rulemaking by the agency. We will be making regulatory decisions on these matters, based on our research and data analyses, over the 1991-93 period.

We have also broadened and improved our motor vehicle consumer information activities. Recently, we expanded our New Car Assessment Program (NCAP), which provides comparative frontal crash data to consumers to include projected results for certain 1991 vehicles that have not been redesigned since previous model year versions were tested. This Information will give new car buyers more test results earlier in the model year, tripling the number of models covered by this program. We also included, for the first time, information on which vehicles have anti lock brakes in the NCAP releases, published data on new car theft rates, and revamped our tire-quality-grading-standard news release. And, we have announced an expansion of NCAP next year to include stopping distance information.

To carry out our "open door" policy, which I believe in strongly, we have held a number of meetings over the past 16 months with consumer and other groups on our motor vehicle activities, such as conducting side impact tests in NCAP, and the retrofit of rear seat lap/shoulder belts, and the safety of vehicles powered by gaseous fuels.

One measure of NHTSA's performance is to compare the rules we have issued to the actions proposed under S. 673, the Senate-passed NHTSA authorization bill of the last Congress. That bill's principal purpose was to direct the agency to issue or amend a number of safety standards. In opposing the bill, we stated we already had the authority to issue the requested rules, subject to meeting the criteria of the Vehicle Safety Act—that is, if we found the rules to be "reasonable, practicable, and appropriate" for the motor vehicles to which they applied. Any legislation directing us to issue specified rules poses the risk that rules will be issued that do not meet the Vehicle Safety Act's criteria. Under agency rulemaking, NHTSA can ensure that rules meet statutory criteria and involve full public participation.

As can be seen by our track record, we have already taken action—particularly in the light truck safety area—on the majority of items in S. 673. We have declined to initiate rulemaking on a few issues in that bill, such as the requirement for 5-mph bumper performance. Manufacturers report that virtually all new cars are equipped with 5-mph bumpers. We also continue to oppose provisions that would affect the agency's actions in other respects. In particular, we opposed the provisions in S. 673 that would have permitted court challenges to the agency's decision to close safety defect investigations.

I mention this comparison of the actions we have taken to those proposed in S. 673 to show NHTSA's continuing commitment to making the most feasible vehicle safety improvements in the shortest possible time. In fact, this commitment is exactly why we did so much of what S. 673 would have required. While we share many of the bill's objectives, something would have to be basically wrong with the administrative process—a process the Congress itself established to deal with technically complex matters—to justify the bill's regulatory directions. We believe the regulatory process is sound, and that it should be allowed to continue to work as provided in the vehicle safety statute.

Enforcement: I will turn now to a brief discussion of the growing effectiveness of our enforcement program. By this program, we seek to ensure that any safety de-

fects or failures to comply with our standards are quickly detected and remedied. The enforcement program is critical if we are to ensure that the drivers and occupants of motor vehicles are not exposed to an unreasonable risk of injury.

For example, MY 1990 passenger cars—those built after September 1, 1989—mark the.beginning of a new era in motor vehicle safety. These vehicles must all be certified to comply with our automatic occupant crash protection standard. Compliance with this standard will result in passenger cars that significantly reduce the risk of occupant injury. In FY 1991 we will test 3O vehicles to assess their compliance with the performance levels in this standard.

I am pleased to report that our oversight of the safety level of the motor vehicle fleet continued to improve in 1990. There were 141 safety defect vehicle recall campaigns for the year, involving some 4.3 million vehicles. Our 65 recall campaigns for non-compliances with safety standards involved another 1.7 million vehicles. Three-quarters of the total vehicles recalled were influenced by NHTSA investigations. We opened 256 investigations involving defects or non-compliances with standards. Significant 1990 recall campaigns included:

- 9.7 million child safety seats from various manufacturers for safety defects or non-compliances with Federal safety standards.
- 475,000 vehicles recalled for faulty rear-brake stop lamp switches.
- 1.5 million vehicles recalled for safety belt problems.
- 285,000 vehicles recalled for rear suspension corrosion.

We begin most of our investigations because of owner complaints. Many of these owner reports are initiated as calls to our toll-free Auto Safety Hotline. Through intensive publicity about the hotline and improvements in its staffing and equipment, we have significantly improved our ability to respond to reported problems. In 1990, we increased the telephone capacity of the hotline by adding 10 lines, for a total of 27. We handled 433,000 consumer calls in 1990, providing safety information and gathering leads for enforcement action. This is an increase of 38 percent from the 313,000 calls in 1989.

Research and Development: Let me now outline our research and development efforts, and the groundwork we are laying for a new generation of safety improvements. During the next 10 to 15 years, many new improvements in the safety of motor vehicles, such as air bags and anti lock brakes, will become standard equipment on the vehicles in the U.S. fleet. New safety features are the product of years of research and development. Introducing new safety improvements into the entire fleet thus requires a long lead-time before their full benefits are realized.

The President, through his National Transportation Policy (NTP), has made a commitment to "cut the death rate and reduce the traffic death toll below the current level through the next decade, even in the face of increasing travel." To support the President's NTP goals and to meet our statutory mandates of future transportation safety, NHTSA developed and recently published an aggressive research and development plan. The research programs the plan describes bring together public and private sector skills and resources to provide the basis for future improvements in vehicle safety performance, driver behavior modification in areas such as drunk and drugged driving, and non-users of occupant protection systems.

Reducing deaths and injuries from traffic crashes in the years ahead will be difficult. We expect continued growth in motor vehicle travel and changes in the travel environment—more older drivers and pedestrians, more large-truck travel, greater disparity in vehicle size and weight, and increased congestion. These factors are likely to complicate our efforts to reduce traffic deaths and injuries. But new technologies and related strategies are being developed to address these emerging safety problems.

NHTSA's research agenda consists of programs in five basic areas: (1) crashworthiness; (2) crash avoidance; (3) highway safety; (4) crash data collection and analysis; and (5) technology transfer. I will touch on each of these areas briefly.

Crashworthiness research is aimed at improving safety in crashes by improving vehicle structure and interior occupant protection designs. These programs rely heavily on advances in biomechanics research, giving us the ability to develop rules that increase occupant protection, such as the new side impact requirements and the crash protection requirements that include the air bag. Some of the issues we are working on in this area include pedestrian protection, crash protection in rollovers, and increased frontal protection in higher speed crashes. We are also developing the next generation crash test dummy.

Crash avoidance research is aimed at improving safety by improving driver-vehicle interaction, and the vehicles themselves, in ways that help avoid crashes or reduce the severity of those crashes that are unavoidable. This includes consideration of the relative interactions in crashes of driver, vehicle and highway/environmental factors. This is the area in which we are assessing the potential of intelligent vehi-

cle-highway systems (IVHS), and developing a state-of-the-art driving simulator for performing human factors and IVHS assessments.

We are just beginning to see the introduction of a vast array of new driver information, communication, and vehicle control systems. These systems have the potential to help drivers sense impending dangers, overcome lapses in their judgment or skills, and even compensate for some of their errors. On one vehicle control system, anti lock brakes, we will complete the tractor phase of our heavy truck anti lock brake field test in July. This will allow us to make regulatory decisions on these devices in the near future.

The goal of our IVHS program, which we are conducting in partnership with the Department's Federal Highway Administration, the Urban Mass Transportation Administration, and the Research and Special Programs Administration, is to demonstrate that improved crash avoidance performance of vehicles can be achieved through application of these advanced systems and technologies to motor vehicles, ensuring that the technologies are matched to the limitations and capabilities of the drivers.

On our National Advanced Driving Simulator project, we have completed the technical/economic feasibility and conceptual design study and we are conducting a competition among universities to select a host institution for the simulator. The National Science Foundation is helping us, and we expect to receive their recommendation this spring. We are also developing a long-range research program for the simulator, in cooperation with the user community.

Highway safety research focuses on the main cause of motor vehicle crashes—human error—and how to improve highway safety by changing behavior. In this area, our main research efforts are in alcohol and drug-impaired driving, speeding, occupant protection and pedestrian safety. The goal of these efforts is to develop, test and evaluate methods to improve driving and pedestrian behavior which can be used by States and local communities in their programs.

Crash data collection and analysis research is carried out by NHTSA's National Center for Statistics and Analysis. The Center develops and uses large-scale automated data bases to support problem identification, program planning, and program evaluation for all of our programs. Currently, we are improving the quality of the data collected at a competitive cost, and expanding the data collected to include more detailed information. These improvements are essential if we are to develop more effective motor vehicle regulations, highway safety programs, and methods of problem identification and evaluation.

NHTSA's Technology Transfer program is defined in terms of information transfer in each of our areas of responsibility. For the first time this year, we will publish a NHTSA research journal. Each issue of the journal will include 3-5 technical articles and list motor vehicle and highway safety research underway and recently completed: We are also planning to expand our activities to provide a better means of access to our research reports and data bases.

Highway Safety: I will now discuss our highway safety program, established by the Highway Safety Act of 1966. Under this program, NHTSA gives States and local communities technical assistance to develop and implement their highway safety programs and formula grants for their conduct of certain priority programs such as alcohol safety.

No review of highway and traffic safety would be complete without mentioning the leading factor in fatal and serious injury crashes—drunk driving. About half of all fatal motor vehicle crashes continue to be alcohol-related and about 80 percent of these alcohol-related fatal crashes involve a legally intoxicated drunk driver or pedestrian (i.e., with a blood-alcohol concentration (BAC) generally greater than 0.10 percent). That means alcohol impairment plays a role in over 22,000 traffic deaths.

Still, significant progress has occurred in recent years, largely as a result of two events: the development of laws such as the age-21 minimum drinking age and enforcement techniques to increase the likelihood of arrest and effective disciplinary action, and the growth of public sentiment against drunk driving, led by citizen activist groups such as Mothers Against Drunk Driving (MADD) and Remove Intoxicated Drivers (RID).

These events have produced significant reductions in drunk driving fatalities. Our traffic crash data show the proportion of traffic deaths related to alcohol declined from 57 percent in 1982 to 49 percent in 1989.

NHTSA's implementation of alcohol safety and drunk driving prevention incentive grant programs, under the authority of sections 408 and 410 of title 23, United States Code, has encouraged States to adopt proven drunk driving measures such as prompt license suspension and mandatory sentencing for repeat offenders. In FY 1990, we obligated a record of $15.4 million in State alcohol safety incentive grants.

The anti-drunk and drugged-driving efforts described in our three-year priority plan should reduce alcohol-related crashes even more. Among these priority strategies are "on-the-spot" administrative license revocation of impaired drivers, lower blood alcohol limits, more severe sanctions for impaired driving convictions, expanded use of sobriety checkpoints, and testing drivers for drugs other than alcohol.

Administrative license revocation, which requires a motorist to surrender his or her driver's license to police following a DWI chemical test failure or refusal, serves to assure prompt sanctions and avoids the delays of congested court systems. We believe this administrative action may be the single most effective sanction available, and we have strongly supported the adoption of administrative license suspension laws. Last year, the agency formed a coalition with the National Transportation Safety Board and 30 other organizations to promote administrative license revocation for impaired driving. Six States have enacted these laws in the past two years, bringing the total number with these laws to 29 States and the District of Columbia.

Sobriety checkpoints are an effective method to increase the actual and perceived risk of apprehension for drunk driving. NHTSA believes these checkpoints can be a key component of a drunk driving deterrence and enforcement program. The agency, in cooperation with the law enforcement community, has prepared guidelines for checkpoints, and is providing advice and assistance to police agencies in their implementation. Following the Supreme Court's 1990 decision upholding the constitutionality of sobriety checkpoints, the number of States regularly using checkpoints increased from six to 17.

Another effective enforcement technique we are expanding is our Drug Evaluation and Classification (DEC) program. The focus of this program is to deter drug-impaired driving by increasing the actual and perceived likelihood that drug-impaired drivers will be detected, arrested, prosecuted, and appropriately sanctioned. The DEC program enhances deterrence by training police to recognize drivers impaired by drugs other than alcohol, and to identify categories of drugs causing the impairment. The officers are then certified as Drug Recognition Technicians. Police in 18 States are now using the DEC procedure, up from seven in 1988. At the end of 1990, our DEC program had trained 1,250 Drug Recognition Technicians in more than 120 police agencies.

A well-planned, highly visible public information effort is an essential component of a program to deter drinking and driving. One project in this area we are especially proud of is the program called TEAM (Techniques for Effective Alcohol Management). The goals of TEAM are to develop sensible alcohol policies for professional sports and entertainment events and to enable stadiums and arenas to act as role models for community actions against drunk driving. Policies are adopted governing such factors as when and where alcohol is sold, serving size, cut-off times, and proper age identification practices.

TEAM is an outstanding example of public and private sector cooperation in the effort to combat drunk driving. In the past year, we have expanded membership in TEAM by adding the National Hockey League, the National Collegiate Athletic Association, Communications Satellite Corporation, and MADD. The National Football League intends to join TEAM for the 1991-92 season. A recent evaluation of the program shows that it reduced alcohol consumption and alcohol incidents in major league baseball stadiums. We feel strongly that initiatives such as the TEAM program must be constantly developed to involve people at every level of the public and private sectors if we expect to continue reducing alcohol-related crashes.

Occupant protection, the use of safety belts and child restraints, is another of our highway safety priority programs. Currently, we are poised to push the safety belt use rate from its present 50 percent to the President's goal of 70 percent by the end of 1992. Nationally, belt use increased from 11 percent in 1982 to 49 percent in 1990. Much of the credit for this increase is due to the implementation of belt use laws. Today, 38 States and the District of Columbia have belt use laws in effect.

Studies of motor vehicle crashes show that front-seat occupants who do not wear safety belts are twice as likely to be killed or seriously injured as occupants who wear their belts. In 1990 alone, safety belts saved the lives of 4,800 front-seat passenger vehicle occupants and prevented 126,000 serious injuries. By raising belt use from 50 to 60 percent, we could save approximately 1,800 more lives and prevent 46,500 serious injuries each year. A 70-percent use rate could save another 1,850 lives and prevent another 48,000 serious injuries each year.

To achieve the 70-percent national belt use by 1992, this summer we begin the most intensive nationwide safety belt campaign ever devised. We might call it the "100 Days of Summer," because the emphasis will be undiminished from just before Memorial Weekend until just after Labor Day. Creative methods of impressing the eye, the ear—and the pocketbook—will deliver the plain common sense wisdom of fastening the safety belt.

The core activities of this campaign will place maximum emphasis on combined public information and concentrated safety belt and child passenger safety law enforcement efforts. The 12 States without safety belt laws will be encouraged to enforce their child passenger safety laws and to remind motorists to buckle up.

Some of the State and local activities this summer will include:

- Enhanced belt law enforcement of 10-14 days surrounding Memorial Day, Independence Day, and Labor Day.
- Press conferences 1 week before enforcement begins to publicize the new enforcement emphasis 'and the importance of buckling upon every trip.
- Public information programs conducted by States and local communities 2-3 weeks before enforcement begins, using media materials emphasizing the national campaign theme: "Buckle Up! Avoid the Summertime Blues.,
- Surveys of belt use before, during and after the summer campaign.

National support for the campaign this summer will include:

- Major press events conducted during "Buckle Up America Week" (the week before Memorial Day), throughout the summer, and during the September Wrap-Up.
- Enforcement-related campaign materials provided to the States and local communities, including radio and TV public service announcements, print ads, and flyers announcing the 1991 Summer Campaign theme.
- General "buckle up" messages delivered through a variety of media and public relations activities, including new Vince and Larry TV and radio announcements, safety belt messages on rush-hour traffic reports, safety belt promotions on "top-40" radio, and newspaper and magazine public service ads.
- A National "70% By '92 Coalition" to generate support for the national campaign at the grass-roots level.
- Results of the 19-Cities Survey of Belt Use to be featured in the kickoff and wrap-up events.
- "Operation Buckle Down," a Federal grant program involving 30 belt use law States, will use police spokespersons to meet with police chiefs to promote participation in the summer campaign.

And the campaign will continue, throughout 1992, taking the effort to another crescendo in the summer of that year, leading to the President's goal of achieving 70 percent safety belt use. We hope to have your support and that of other members of Congress in achieving this goal.

Motorcycle safety is another one of our highway safety priority programs. Unhelmeted riders are three times more likely to incur a fatal head injury and twice as likely to incur a head ~~injury~~ of lesser severity than riders wearing helmets. Today, 23 States, the District of Columbia and Puerto Rico require helmet use by all riders.

Though wearing a safety helmet is the best defense against a head injury in a motorcycle crash, the best defense against having a crash in the first place is the knowledge and skill needed to ride a motorcycle safely. NHTSA strongly advocates approved motorcycle safety courses and, over the past few months, we have established working relations with various motorcycle "rights" groups, such as the Motorcycle Riders' Foundation, to cooperate on driver licensing and training activities. We will be doing even more in the education and training area in the future.

NHTSA's pre-hospital Emergency Medical Services (EMS) program is another highway safety priority program. Studies show that pre-hospital medical treatment of a crash victim by an Emergency Medical Technician results in a 9.5 percent greater probability of surviving than a victim attended by someone with only basic training.

We are concentrating our main EMS efforts in three areas. The first provides technical assessments of the States' pre-hospital EMS programs. We have completed eighteen of these assessments to date. The States are finding our evaluations very helpful, and they are using them to pass needed legislation, to obtain funds for their programs, and to plan for current and future needs.

The second EMS area of concentration is a course on the conceptual framework needed for the development of a trauma system at the State or community level. We gave eight workshops over the last year on this subject and we plan to expand this program in coming months.

The third EMS area of concentration is the application of a measure, known as a "sensitivity index," to evaluate the timeliness and appropriateness of EMS and other highway safety countermeasures for crash victims. The evaluation requires the linkage of several data bases, including police report, pre-hospital report, and hospital discharge report. The four States that have used this evaluation method have found it helpful, and the agency, in cooperation with the National Association of Governors' Highway Safety Representatives (NAGHSR), will continue to provide technical assistance linking the data bases to the evaluation.

Each year about 7,000 pedestrians are killed and 110,000 are injured in traffic crashes. NHTSA and the Federal Highway Administration (FHWA) jointly administer the section 402 pedestrian safety program, and over the last several years, our agencies have worked to ensure that these efforts are complementary. Recently, NHTSA and FHWA decided to sponsor a joint pedestrian safety program designed to provide resources and assistance to States and communities for community-based pedestrian safety programs.

During FY 1990, our joint activities in this area have included a community traffic safety grant program to improve pedestrian safety, with seven grants awarded in FY 1990 and five more scheduled for FY 1991. We also are considering a joint rulemaking action to add pedestrian safety programs to the national program priority list under the section 402 grant program.

Last month, NHTSA and FHWA jointly issued a final rule providing guidelines to States for a uniform parking system for drivers with disabilities that limit or impair their ability to walk. The rule, required by a 1988 statute and developed with an advisory committee representing people with disabilities as well as State and local enforcement agencies, is designed to enhance the safety of these people and their access to parking spaces. By restricting qualifications for special license plates and placards, the rule will enhance the safety and fair treatment of disabled motorists, who face special problems when they travel due to the States' varied license plates and permits now in use.

Besides calling for reciprocity of enforcement among the States, the rule adopts the International Symbol of Access (side view of a person in a wheelchair) as the identifying symbol for vehicles occupied by disabled motorists, sets design and construction standards for parking spaces reserved for disabled motorists, and sets conditions for issuance of special license plates and for removable windshield placards to be hung from the windshield rearview mirror, when the vehicle is not in operation, for enforcement purposes.

Last April, NHTSA held a Traffic Safety Summit in Chicago—the first of its kind ever held—where 200 leading State and local law enforcement officials shared their views on how Federal, State, and local authorities can better address problems such as drunk and drugged driving, speeding, safety belt use, and commercial vehicle safety. A Traffic Safety Summit Implementation.Group was created to track the progress in carrying out the recommendations of this Summit, and to provide guidance to law enforcement officials on more activities that could be tried.

This June, we will sponsor Traffic Safety Summit II in Orlando, Florida for members of the judicial and prosecutorial communities. The subject will be one of NHTSA's major highway safety goals—how to improve the prosecution and adjudication of traffic safety offenses. The results of Summit II should help us to identify what we can do to back up our highway safety enforcement program with more effective prosecution and adjudication.

Now I would like to turn to the highway safety proposals and authorization requests we submitted last month.

Highway Safety Proposals and Authorizations: Authorizations for the National Traffic and Motor Vehicle Safety Act of 1966 and the Motor Vehicle Information and Cost Savings Act expired at the end of fiscal year 1985, and the current authorization for NHTSA's highway safety program expires at the end of this fiscal year. S. 610, the "Surface Transportation Assistance Act of 1991," includes our proposed reauthorization of the highway safety program, together with that of the motor vehicle safety and cost savings programs, for the next five years. It is based on the principles of the President's National Transportation developed with the assistance of experts in both the public and private sectors.

For highway safety, we propose to continue the section 402 State and community grant program as the core element' of the Federal effort. This program, through its focus on essential State and local highway safety needs, such as drunk driving countermeasures and safety belt use actions, has been instrumental in improving public safety. The 402 program would continue to identify and keep current the most effective State and local programs for Federal financial assistance.

For our 402 program, we are requesting $140 million for each of FY's 1992-1996, out of the Highway Trust Fund. Although this request discontinues the current practice of earmarking 402 funds for various purposes to permit greater flexibility in State expenditures, $25 million of these funds are to be set aside each year for a new Safety Bonus program, jointly managed by NHTSA and FHWA.

The Safety Bonus program is designed to give new momentum to the 402 program by rewarding States with bonus funds for adopting criteria to advance State and local highway safety programs within the 402 framework. These criteria, which are assigned credit values for computing the bonus amounts, would encourage proven drunk driving measures, such as prompt license suspension and mandatory sentenc-

ing for repeat offenders. It also would promote other high-priority programs such as those for increased safety belt use, public campaigns directed at high risk driving behavior, emergency medical services, and pedestrian safety.

Bonus funds will come from annual $25 million set-asides in each of NHTSA and FHWA's 402 programs, as well as $25 million authorized each year, out of the Highway-Trust Fund, for alcohol safety programs. Bonus funds will be also set aside from FHWA's Urban and Rural Program, starting at $5 million in FY 1992, $55 million in FY 1993, then rising $25 million per year until it reaches $130 million in FY 1996.

Our proposal also retains the basic components of the section 403 highway safety research and demonstration program, which stresses research on such topics as the effects of alcohol and drugs on driver behavior, and adds research activities on biomechanics research that focus on the injury tolerances of older drivers and pedestrians and on Intelligent Vehicle-Highway Systems (IVHS). In addition, authority is provided to undertake collaborative research and development, on a cost-share basis, with non-Federal entities to encourage solutions to highway safety problems and the marketing of related technology. We are requesting $45,869,000 for FY 1992 and such sums as necessary for each of FY's 1993-1996 for our section 403 highway safety research and development activities.

Other Authorizations: I already mentioned our authorization requests for NHTSA's section 402 program, providing a set aside for the new, NHTSA/FHWA Safety Bonus program, our separate request for alcohol safety for the bonus program, and our request for section 403 highway safety research and development activities. We have three remaining requests, each funded by the Highway Trust Fund.

Our first request, $68,722,000 for FY 1992 and such sums as necessary for each of FY's 1993-1996, is for our motor vehicle safety responsibilities under the National Traffic and Motor Vehicle Safety Act of 1966. Our second request, $6,485,000 for FY 1992 and such sums as necessary for each of FY's 1993-1996, is for our consumer protection responsibilities under the Motor Vehicle Information and Cost Savings Act. The funds for both requests would come from the Highway Trust Fund. The Department believes that, wherever possible, programs which benefit a specific class of users should be funded by those users. Since NHTSA's motor vehicle safety and cost savings responsibilities substantially benefit highway users, we believe the fuel taxes paid by those users, which supply the majority of the Highway Trust Fund's revenue, should be used to fund these programs.

The last request, $6,131,000 for FY 1992 and such sums as necessary for each of FY's 1993-1996, is for our National Driver Register (NDR) program, the Federal program that assists the States in their exchange of information on the driving records of problem drivers. The NDR is in a multi-year transition to an electronic, interactive operation, as required by the NDR Act of 1982, and our request reflects the costs associated with the transition. Since the NDR is now operating at a level that clearly benefits highway users, we believe the funding for the program also should be shifted to the Highway Trust Fund.

This concludes my prepared remarks. I will be glad to answer any questions you might have.

Senator BRYAN. General, I thank you very much. Those announcements are good news, and I congratulate you and your staff. As you know, those were issues that were addressed in S. 673 in the last session——

Mr. CURRY. Yes.

Senator BRYAN [continuing]. Of this Congress, and I think all of us who are interested in this field would compliment and congratulate you and your staff for that fine work.

Mr. CURRY. Thank you.

Senator BRYAN. I must say that every time that you come to appear before us you bring us more good news. It almost suggests a precedent that we should have you here more often. We are delighted, and I think everybody on this committee is most pleased to hear that.

Let me ask you generally, if I may, in terms of the kind of rulemaking that you are considering—those that may be in process—would you rank for me your own priorities?

Mr. CURRY. Certainly.

Senator BRYAN. I don't want you to get down into the 10, 15, 20 category, but what in terms of your own rulemaking priorities that you're considering or contemplating do you view as the first priorities?

Mr. CURRY. Thank you, sir. Mr. Felrice, where are you? Barry is hiding on my left. Mr. Felrice is prepared for that question, and he will be glad to give you the answer.

Senator BRYAN. You bet. He's not a stranger to this committee.

Mr. FELRICE. I hope I am prepared anyway. It is—I guess I can rank them, Mr. Chairman, at least in order of the magnitude of the problem. Since some of these are still in the developmental stage, it is unclear to us exactly what the benefits will be but, hopefully, they are proportional to the size of the problem.

I think rollover would be the No. 1 priority. We have about 10,000 deaths a year associated with vehicle rollover. Those deaths occur not just in light trucks or sport utilities, as most people think, but it's also a very big problem in passenger cars, particularly small passenger cars. We made a decision late last year, as we announced in our priority plan, to pursue regulation in that area, and hopefully we'll have a public announcement of exactly what that will be sometime this summer.

Second, I think, is head injuries. We issued in our side-impact rule last year a regulation that will protect occupants from chest and pelvic injuries. We started research later in the head area. That research is scheduled to be completed this June, and we have also put in our priority plan that we will make a regulatory decision on this matter this calendar year.

The third area is probably improved frontal protection. That might be higher speed protection, it might be protection in different types of crashes, such as offset crashes compared to the full barrier crash protection that we have today. That is also in our plan. The research on that is ongoing and will probably take at least another couple of years. Mr. Parker may want to add to that.

Senator BRYAN. Mr. Felrice, can you be a little more specific in terms of frontal protection? I'm not sure that I fully understand what you're talking about.

Mr. FELRICE. Well, we think because about one-half of all fatal and serious injuries are frontal crashes, that even though we believe that all new cars and light trucks will have airbags by the middle or latter part of this decade, there will still be anywhere from 6,000 to 10,000 deaths a year associated with frontal crashes. What we want to do is see if we can reduce that total as much as we can.

Senator BRYAN. I interrupted you. You may have been addressing another couple of priorities.

Mr. FELRICE. I would leave those to be the top three that stand out.

Senator BRYAN. Well, I think few, if any, would quarrel that those are important issues to address.

Let me, if I can, get back to you, General Curry, and you can defer to any member of your staff here to fill this in. In terms of the rollover standards, you've been very, very good when you've in-

dicated that you're going to have something done within a particular timeframe.

As you recall, during your confirmation hearing we talked about that side-impact standard and you indicated that you would do it and you did. I think that is to your credit. Can you give us on the rollover standard, a timeframe, in which we might see a rulemaking completed? I am not asking for a precise date, but can you give us at least some sense as to how far you are and when we might see that standard?

Mr. CURRY. Well, the research and development on that will be concluded this summer. We will close that out. And, as you know, as soon as that happens, then we have to take it into our review process and everybody has to get a look at it. It goes throughout the agency. Everyone comments on it. We have a requirement to make a decision, and the decision is, having looked at the research and development results, does it make sense to do something or do we come to the conclusion that it doesn't make sense. Our best guess is it will make sense to do something. If so, then we will at that time have to make a regulatory decision; that is, do we go for a notice of proposed rulemaking?

Let's say that we finished the research and development by the end of July or August 1. Sometime between that time and the end of the calendar year that decision would be made in the normal process. So, you would find us in the position, then, of making a decision to begin rulemaking or to say, "No, we failed in our research development." I don't think we will fail. I think we will move on that, but that is the timeframe, I think.

Senator BRYAN. So, would it be fair to conclude from that, without prejudging what your conclusions will be, that we will see either a decision by the agency to begin rulemaking or not to pursue it for the reasons which you have alluded to?

Mr. CURRY. Yes.

Senator BRYAN. Or the more likely scenario which you suggest, and I think most of us in this committee hope will be the case as well, a rulemaking during this Congress? I'm trying to give you——

Mr. CURRY. Yes.

Senator BRYAN[continuing]. A little slack.

Mr. CURRY. Yes. We believe it will be this calendar year during this Congress. It is in our new priority plan; and you will see it there.

Senator BRYAN. Let's talk about head injury. That is something, as you know, that came up within the committee. We talk about saving 9,000 lives a year with airbags. But there is also some testimony, as you both recall, that in terms of injuries we may be talking about another 150,000. Again, the same line of question in terms of how far are you along in this rulemaking? When might we see the agency make a determination as to whether, in your view, rulemaking can proceed or for the reasons which you have alluded to previously, the agency might conclude to the contrary?

Mr. CURRY. It is much more difficult in that one to give you a time, and Barry will be happy to address that with you. As you know, the decision was made by the administrator who was running the agency in the late 1970's for the agency at that time, to

pursue the rulemaking in terms of the pelvis and the chest, not to pursue the head injury criteria. So you sort of get into a path that you must follow.

We seem, fortunately, to have come through to fruition; we are now pursuing the other part of that area which we feel is very important. I cannot give you a specific. Barry, maybe you can tell us.

Senator BRYAN. Mr. Felrice.

Mr. FELRICE. That is another area where we hope the research will be completed this summer. We started the research in earnest and made it a high priority a few years ago. We have tested probably about 15 to 20 vehicles now, tested the interior components, the A pillars, the B pillars in four-door vehicles, the rails above the windshield, and the strong parts of the car above the window. We have developed a test procedure and we have been striking those parts of these vehicles at different angles and at different speeds to get some baseline information. We have also installed some energy-absorbing padding to see what reduction in head injury numbers we could get.

If we live cleanly, that research should be completed this summer but, again, we have to bet on the outcome, not having seen the results. I am not quite sure what it says yet. But if that research is favorable, then we will be in a position this year to make a rulemaking decision, and that could either be an actual rulemaking notice this calendar year or early next calendar. But certainly, in this Congress, we will be able to start that rulemaking process.

Mr. CURRY. And I think my R&D chief here, George——

Mr. PARKER. Mr. Felrice has mentioned a lot of R&D projects, and since I am in charge of R&D I thought I would step in and say a few things. The upper interior head protection is a very high priority, and as Barry said, we're optimistic we'll finish with that this summer with a positive result. The test procedure we developed is quite complex but we are optimistic that it will work out.

Senator BRYAN. Well, we are too. When you're optimistic we are optimistic about this. Let's turn to the improved frontal protection. The same line of questions on that. General, whomever you care to defer to on your staff.

Mr. PARKER. I will take a shot at this one. This is also a priority on the research side of the agency. That is a very complex issue. We have been studying the crash data for some time to find out, after all vehicles have airbags and if there is a high use of safety belts, lap and shoulder belts, what's going to be left in terms of fatalities, and Barry mentioned there will still be between 6,000 and 10,000 deaths a year associated with frontal crashes, and those are the numbers we have come up with also.

The work we have done so far shows that intrusion in certain frontal crashes is a problem, especially with smaller vehicles. And we have embarked on a research program to look at that type of injury-causing mechanism and to see what sort of a test procedure and vehicle improvements we can study to reduce the fatalities caused by what is left in frontal crashes after everybody has airbags and they are using their belts at high levels. That will probably result in a regulatory decision, I believe the priority plans say in 1992; but we expect that that research will run for maybe a couple more years after that time.

Senator BRYAN. Mr. Parker, would it be fair to expect that in terms of the timeframe or the sequence, recognizing the complexity of this area, that we are looking at roughly the same timeframe for decisionmaking as we are the other two issues, the rollover and head injury; would that be a fair conclusion?

Mr. PARKER. I do not believe so, Mr. Chairman. I believe this is a much longer program. As I said, we have in the priority plan a regulatory decision next year. We hope that the research will be at a point to make a preliminary regulatory decision at that point in time, but I think that research will go on for at least a year or two after that.

Senator BRYAN. OK. That's helpful. Without retracing areas in which there is some disagreement, as you know a position that I, the ranking member, and others of us on the committee have taken is that airbags should be required. We certainly encourage you to rethink your position on that because we think airbags do provide some extraordinary frontal protection. Without getting involved in that issue again, let me take you into a couple other areas briefly, if I may.

Later this morning, and you probably have gotten a glimpse of the testimony, the Insurance Institute for Highway Safety will opine that in their crash studies of 1991 vehicles, of the 22 models that they tested with respect to bumper standards only two had damage totals under $1,000 as a result of a 5-mile-an-hour crash. You are all familiar with that history and background. Originally it was a 5-mile standard and now that has been reduced to 2½ miles per hour as the current requirement.

Let me get your response to that. You are doing a lot of things that are very positive. I realize that you were not the ones to change that standard on your watch, General Curry, but I must say that those numbers seem to suggest that we've kind of slid backward on that one over the years.

Mr. CURRY. We have great respect for the work that is done at IIHS. We believe them to be a very honest, hardworking organization that really is trying to do its very best to help us all save lives on our highways and we appreciate that very much. As I look at the bumper issue, the standard, the real issue here is property damage not a safety regulation. So, automatically I assign that a lower priority than I do such things as light trucks, school buses, airbags, and side impact. I do that because I have finite resources and I try to concentrate on those things that will save the most lives.

The bumper standard was lowered, as you point out, from 5 miles an hour to 2.5 in 1982, and that was based on extensive analysis of the previous 5-mile-an-hour bumpers and on the comprehensive rulemaking record. Now, many people did not like that decision. IIHS, for example, along with State Farm and Allstate, sued this agency to return it from 2.5 to 5 miles an hour. The agency's findings were upheld by the U.S. Court of Appeals for the District of Columbia Circuit in January 1985, which found that the agency, in fact, followed reasonable procedures in amending that standard.

Having said that, though, I would say to you, Mr. Chairman, that I think that is little comfort to somebody who is spending $2,000 for the repair of a vehicle. Even though I recognize it is the

insurance companies that really pay the money and consumers just pay the deductible.

Senator BRYAN. I think we would all agree that whatever the insurance company costs are, to the extent that they increase, ultimately all of us as purchasers of insurance pay that cost.

Mr. CURRY. We agree. I plan later in this calendar year, by the way, to again look at that issue.

Senator BRYAN. All right.

Mr. CURRY. I was the one to make the decision not to and I was the one who decided to put the emphasis on side impact.

Senator BRYAN. I understand.

Mr. CURRY. But I have been concerned about this and I am willing to reexamine it. I intend to look at it before the year is out.

Senator BRYAN. All right. So, you are going to reexamine the question.

Mr. CURRY. I think we need to.

Senator BRYAN. All right. We read a lot these days about antilock brakes and the potential they have for highway safety. As you know, that is one of the provisions that is included in our draft bill for comment. From what I have read, and I welcome your comments here, there is an enormous potential there for safety. I have seen a lot of that as it relates to heavy trucks. I realize that is beyond the scale of this committee's jurisdiction, so I would not get into that, but why not open a rulemaking and receive testimony on antilock brakes? Have you taken a look at that, and if so, why do you not share with us where you are coming from.

Mr. CURRY. We have looked at it. I have driven those kinds of vehicles all over the world personally in the Far East and Europe. Undoubtedly, it is a very fine advance that is coming. That and traction control are very fine advances. Both are much the same thing, even though antilock is much closer to becoming fully developed than the other is.

At the same time, we are involved in a 2-year study on heavy trucks with antilock brakes. So the agency, in fact, does plan sometime in the next 2 to 4 years to be in a position, after our research and development and testing are done, to undertake some definitive rulemaking. We hope this will cover antilock brakes for heavy trucks, and I have met with heavy truck manufacturers throughout America and we have discussed this. Also they are very comfortable that the test is going well. They are participating in it and they think that we will be able to do some rulemaking that makes sense.

The American Trucking Association, also, by the way, has discussed this with me, and they are not opposed to the study that we are doing. I have not put that at a higher priority, looking at those items because it was very clear to me that, like airbags, they are starting to filter into the system. As time goes on, we will probably take a look at that, but it seems to be progressing toward cars right now and manufacturers are doing it starting with the more expensive models. I would suggest that we will be talking a serious look in the future. Not today.

Do you have something? You are ready to go.

Mr. FELRICE. If I can just add to what the administrator said. Antilock certainly has more benefits for the heavier vehicle where

there is a wide disparity between the vehicles' unloaded and fully loaded weight. That is where it is much harder to design a brake system. That's where antilock really helps. We are seeing voluntary installation on 75 percent of all domestically produced light trucks. That includes vans and pickups. They do have antilock brakes as either standard or optional equipment right now. As part of our evaluation of the rollover problem, we are starting to look at the accident data for those light duty vehicles, because most vehicles roll over because they lose their directional stability. They are no longer moving forward on the roadway; they are sliding off and then they are tripped by something. If we can prevent that loss of directional stability—and antilock can be a big factor in that—then we will have solved a lot of the rollover problem. So part of our rollover analysis is to see if there is a correlation between whether a vehicle has antilock and its incidence on rollover-type crashes. That will be part of our rollover rulemaking.

Senator BRYAN. And, Mr. Felrice, as you reminded the subcommittee when you commented earlier, there is sometimes the perception that the rollover problem is only that of the utility vehicles and you are indicating that is certainly a much broader issue than that. Are you, in the context of your rollover standard for passenger vehicles, are you also looking at the antilock brakes with respect to directional stability on those vehicles as well?

Mr. FELRICE. Yes, sir, absolutely.

Senator BRYAN. We hope you will take a look at that. I realize you have got a full plate, but I must say that at least some of us are a bit troubled and unpersuaded with the notion that the safety improvements, which admittedly are coming into the marketplace on the high end of the scale, seem to suggest that if you can afford a luxury vehicle that you get those safety features, but those who are in middle income range vehicles and the less expensive vehicles must wait. I must say that that disparity, at least to a lot of us, suggests that what is sauce for the goose ought to be sauce for the gander, and folks who are not able to afford those more expensive vehicles ought not to be in a situation which they have less safety opportunity than those who are part of middle income America. I would respectfully again suggest that you take a look at those things as you evaluate.

I think Mr. Parker was ready to offer a comment. I'll give you a chance to.

Mr. PARKER. A statement on your last comment on luxury cars. We are seeing antilock quickly move down to the lower price cars. I think General Motors has made an announcement that they expect antilock to be in some of their medium and lower priced cars in a couple years, so we are seeing antilock moving to other car lines besides luxury cars.

Senator BRYAN. Well, that is good news. Again I would respectfully suggest that no agency within the vast Federal bureaucracy can do more to accelerate that trend than those of you who are here today at the table, and that is simply my point. We are delighted to have you here and pleased to hear your announcements and please keep those coming.

Mr. CURRY. You will call a hearing every day.

Senator BRYAN. Absolutely. We can arrange to do this all the time, and some progress is being made. I think all of us, notwithstanding some differences some of us have with you on the airbag issues and on others, do appreciate the progress that you are making, General. We wish you and your staff the very best, and we will in this calendar year expect some decisions from you on rollover standards and head injury and hopefully that will bear fruit in the form of a rulemaking. We thank you so much.

Mr. CURRY. Thank you, Mr. Chairman.

Senator BRYAN. Our first panel this morning will consist of Ms. Joan Claybrook, President of Public Citizen, Mr. Clarence Ditlow, the Director of Center for Auto Safety, Ms. Micky Sadoff, who is the President of Mothers Against Drunk Driving. We would like to welcome each of those panelists to our hearing.

Ms. Claybrook, we will begin with you, and you are no stranger to the subcommittee. And we will indicate to each of the witnesses who are testifying here this morning that your full unexpurgated testimony will be made a part of the record here, and we will try to confine you, if we can, to 5 minutes each. Let me open with you, Ms. Claybrook, if I may.

STATEMENT OF JOAN CLAYBROOK, PRESIDENT, PUBLIC CITIZEN, WASHINGTON, DC

Ms. CLAYBROOK. Thank you very much, Mr. Chairman. I am here representing Public Citizen of which I am president and also Advocates for Highway and Auto Safety which is a coalition of consumer safety and insurance organizations formed to promote changes in public policy and reduced death and injury on highways, and I am accompanied this morning by Timothy Court, who is the director of safety for Nationwide Insurance, the program cochair for Advocates, and an alumnus of NHTSA having spent 17 years there working as an engineer.

We believe that the reauthorization bill ought to be passed. The inflation adjusted cost of highway crashes is something over $85 billion annually. The death and injury on the highway continues unabated, exceeding for the Americans involved in Operation Desert Storm, the total military personnel killed, every day on our highways and, in addition, nearly 4.8 million Americans are injured, 500,000 of them hospitalized.

We believe that there are many opportunities for reducing death and injury on the highway and we appreciate the specificity of your legislation which would place mandates and requirements on the agency. This is necessary because of the Office of Management and Budget is not always so sympathetic with the need for these kinds of actions and so we think the deadlines are essential.

In addition, the funding of the agency should be geared to its rulemaking programs, and if these are not clearly laid out, the funds will not be made available. We believe that there are four particular areas that the agency should concentrate on in the future, and in mentioning these I would like to integrate some comments on the testimony by General Curry.

Our four proposed priority areas are head injury—and this is for the near future, head injury, pedestrian safety, safer braking systems, and biomechanics research.

Senator BRYAN. Could you repeat those one more time, Ms. Claybrook?

Ms. CLAYBROOK. Yes. Head injury, pedestrian safety, safer braking systems, primarily antilock, and biomechanics research. I would mention that on July 25, 1989, our President Bush signed into law a resolution passed by the Congress designating the 1990's as the decade of the brain. And we do believe that the most important issue in our auto crash safety is protecting against head injury, the most important thing.

Each year about 1.3 million people suffer head injuries with medical costs estimated at more than $13 billion. The Society of Automotive Engineers has estimated that each year automobile crashes are responsible for more than 290,000 brain injuries or 80 a day, 80 brain injuries a day, and of course the effect on families of people who are either in the vegetative state or unable to operate or are unable to continue their jobs is enormous.

Advocates of highway safety have pursued this issue with some vigor and will soon release a study of head injury which has some very significant findings and I would like to just briefly mention the—in summary what those findings are to you today, because they are new information and particularly significant. What we did was look at the data from the National Highway Traffic Safety Administration national accident sampling system for the years 1988 and 1989 to determine what opportunities there are available for abatement of head injury.

NASS is a sample of our police report and crashes and they are quite detailed in NHTSA's files. What we found was that injuries suffered by car occupants are almost equally divided between restrained and unrestrained, but with the injuries to the unrestrained occupants about twice as severe. The study divides total harm suffered into the area of the vehicle which causes the injury. For both groups about 20 percent of the head injury is caused by the upper structures that surround the windows of the vehicle, and another 30 to 40 percent of the harm is caused by other vehicle components that are located close to the head.

NHTSA tests show that energy-absorbing structures and components are highly effective, highly effective in reducing head injuries, particularly in speeds in the 20- to 25-mile-an-hour range, but even beyond that, these structures provide significant protection. Using the results of the NHTSA research, we estimate that our overall reductions of harm would result from energy absorbing components is about 20 percent and corresponding reductions of severe head injury would be 30 to 40 percent.

An annual benefit we estimate of 2,000 lives saved is a conservative one—2,000 lives saved with just energy absorbing structures in this area. Now, this is particularly important in addition to cars because for light trucks and vans you can add another 650 lives saved, so what you are talking about over 2,500 lives saved a year if all vehicles were so equipped.

Now, stopping for a moment and mentioning the testimony by General Curry, when they talked about rollover standard, I believe they were talking about a precrash standard, not about a crashworthiness standard; that is, a standard dealing with the track width and the center of gravity height and so on. I do not believe they

were talking about a crash avoidance standard. That was not clarified in the testimony. So, they weren't talking about protection of head injury when the crash occurs.

In the head injury, the discussion that they had was dealing with only with the side impact standard. We believe that the head injury standard ought to be a issue that deals with head injury, regardless of whether it is a side or rollover crash, and that it ought to address energy absorbing structures in the upper portion of the vehicle. The standard that was announced today for roof crush would allow 5 inches of roof crush. I don't know anybody who is going to be enormously protected when a vehicle is rolling over and the body is thrown against the roof and there is allowed 5 inches of roof crush. It really requires a much more substantial effort than that, and so we would like to urge the committee to take a look at this issue from the point of view of head injury.

I would also like to say that the cost of these energy-absorbing structures is very small. We are talking about metal structures that are energy absorbing and padding that is inexpensive. It is essentially a friendly interior, something that General Motors promoted in lieu of airbags. We think it ought to be promoted in addition to airbags, and particularly looking at how to protect the head.

If I could have a few more minutes, Mr. Chairman. I know I am out of time here on your clock. So, in addition to the rulemaking for head injury and rollover, both side-impact protection and the roof crush, we think that the rulemaking for preventing rollovers is very important, which the agency discussed.

Second, we want to talk just briefly about pedestrian safety—7,000 fatalities, 150,000 serious injuries a year. A very large number of those injured are children and older Americans. And the agency has done a significant amount of research. In 1981 I issued an advanced notice of proposed rulemaking. That has been pending unattended for a decade. The agency has done enough significant research, they know how to address this issue, and we appreciate the bill that you have introduced has some proposal for initiating rulemaking. We urge you to retain that.

On the antilock braking systems, you probably are aware that there was a standard in effect from 1976 to 1978. Japan and the economic—European Economic Community have standards for antilock brakes for large vehicles. It is the most important issue in protecting against crashes with large trucks. It is not unimportant. Something approaching 4,000 people a year are killed in truck/car crashes. That is a very large number of individuals and most trucks are not properly loaded and as a result they jackknife and have a good problem particularly in bad weather and, as you know, there are also pending a number of proposals to enlarge the size of trucks. In addition, the 80,000-pound limit that now exists has been violated more than it is been met.

Third on biomechanical research, last year the safety community got increased from $2 to $5 million in the biomechanics research money available to NHTSA. NHTSA has not used this just for biomechanics research. The head injury, frontal crash protection improving all rests on the issue biomechanic research. Measuring the kinds of entry levels that occur, developing the kind of instrument dummies that do this measurement properly, and we feel

that the agency is not giving sufficient attention to this. Really this is an agency whose research is starving. The research budget and crashworthiness should be doubled. It is something in the nature of $8 to $10 million a year. It is a flyspeck on the Federal budget and there is no reason why, given the number of people killed a year, given the amount of money we spent on Desert Storm in trying to save lives, why the number of lives we lose every year routinely on a highway should not be protected with a modest increase of $8 or $10 million in biomechanics research.

TRB, the Transportation Research Board, has recommended an increase, significant increase, and my testimony does document the reasons why this increase should occur. And it has—this research has played an enormously important role in the development of the existing standards which we estimate saved, based on NHTSA data, approximately 150,000 lives since 1967.

There are a few other issues that I would urge the legislation contain, including a bumper requirement, a standard requirement, child booster seats, darkened windows, not just research but a standard. I issued a standard in 1981. It was revoked before it took effect. The standard is already on the books. It could be just reissued. It is a very easy standard to address. The crashworthiness data, integral head restraints, which would save the companies money not cost them money, and the reinstitution of research safety vehicle program which shows what can be done to manufacture a socially responsible car.

I thank you for the opportunity to testify, Mr. Chairman. I'll be glad to answer any questions.

[The prepared statement of Ms. Claybrook follows:]

PREPARED STATEMENT OF JOAN CLAYBROOK

Mr. Chairman, members of the Committee, good morning, my name is Joan Claybrook, I am president of Public Citizen and former Administrator of the National Highway Traffic Safety Administration (NHTSA) from 1977 to 1981. I am here this morning on behalf of Public Citizen, a national public interest organization with 100,000 members, and Advocates for Highway and Auto Safety, a coalition of consumer, safety and insurance organizations formed to promote changes in public policy to reduce deaths, injuries and economic costs associated with motor vehicle crashes and to curtail fraud and auto theft. I am accompanied this morning by Timothy A. Hoyt, Director of Safety for Nationwide Insurance, who is the Program Co-chair of Advocates, and is also an alumnus of NHTSA having spent seventeen years working for the agency. I am here this morning to indicate our strong support for congressional reauthorization of the National Traffic and Motor Vehicle Safety Act of 1966 and the Motor Vehicle Information and Cost Savings Act.

We believe the reauthorization of the vehicle safety programs offers an unparalleled opportunity to increase the safety on our roads and highways with unused but available technologies. Motor vehicle crashes constitute a major public health dilemma, and the costs to society for these crashes are more than $85 billion annually. The 1989 report to Congress, "Cost of Injury in the United States" produced by the Centers for Disease Control, NHTSA, the University of California, San Francisco, and the Johns Hopkins University, indicates that this figure does not tell the whole story. Using an alternative method of quantifying pain and suffering which values human life according to the amount individuals are willing to pay to avoid injury and death, the figure is much larger. The American public would be willing to pay an estimated $1.1 trillion per year to eliminate all fatal and nonfatal injuries.

Today, motor vehicle crashes are the leading cause of death of Americans under the age of forty-four. Every single day, as many Americans die on our highways as U.S. military personnel were killed during the 45 days of Operation Desert Storm—more than 120 daily and nearly 45,000 people per year. Additionally, nearly 4.8 million Americans are injured and 500,000 more are hospitalized each year in automobile crashes. This toll is especially bitter because many of these deaths and injuries

disable our youth and could be prevented with effective automobile safety countermeasures.

The challenge of reducing deaths and injuries from traffic crashes is a difficult one. Increases in motor vehicle travel, changes in the profile of the traveling public—older drivers and pedestrians, larger trucks, smaller cars, and a decaying highway infrastructure will likely contribute to an increase in deaths and fatalities on our highways.

Public concern about the unacceptably large number of highway related fatalities and injuries has resulted in 38 states and the District of Columbia with safety belt laws. The recent announcement by NHTSA to inaugurate a safety belt campaign that combines an aggressive public relations campaign with innovative enforcement strategies hopefully will increase use rates which currently are lower than they should be, about 47 percent nationally. Additionally, the widespread public interest and consumer preference for air bags and hopefully, the speedy enactment of S. 591, the Highway Fatality and Injury Reduction Act of 1991 sponsored by Chairman Bryan and Senators Danforth, Gorton and Adams, making air bags standard in the front seating positions of cars, vans, trucks and buses, should help stem the numbers of deaths and injuries on our highways.

This morning I would like to address four major issues related to automobile safety where I believe Congress needs to direct additional resources and requirements in order to reduce deaths and injuries as well as lay the groundwork for developing the next generation of safety improvements for tomorrow's automobiles. These are areas currently not being emphasized in the program priorities of NHTSA. Briefly, these are head injury, pedestrian safety, safer braking systems and biomechanics research. We urge the Senate to move this legislation quickly and to work persuasively with your House Commerce Committee colleagues, whose leaders have prevented enactment of a NHTSA reauthorization bill since 1982—almost a decade of neglect and obfuscation.

HEAD INJURY

On July 25, 1989, President George Bush signed the law passed by Congress to establish the decade of the 1990's as the Decade of Brain. This was an initiative of the late Representative Silvio O. Conte, former ranking Republican member of the House Committee on Appropriations, and a great supporter of auto safety programs. When asked why he had so ardently supported passage of this legislation he stated "I heard their pleas and saw what the government was spending for health and education services. Many of these problems are centered in the brain and central nervous system. The research we as a society dedicate to the brain is a pittance compared to what we spend on programs to help these individuals * * *" Each year, about 1.3 million people suffer head injuries with medical costs estimated at more than $13 billion, according to a report by the Institute of Medicine of the National Academy of Sciences.

Unfortunately, one of the major causes of brain injury is automobile crashes. In fact, automobile crashes are the leading cause of epilepsy today.

According to a Society of Automotive Engineers (SAE) report it is estimated that each year automobile crashes are responsible for more than 290,000 brain injuries or 80 a day, of which 13,000 or 35 a day are severe and 2,000 or 5 a day result in a nonresponsive state. Advocates for Highway and Auto Safety will soon release a study of head injury which has significant findings, both in terms of quantifying the severity of head injuries in motor vehicle crashes but also, in demonstrating the benefit of simple, but effective improvements to the interior of a motor vehicle. Let me briefly describe in summary some of these findings. We will provide a copy of the final report to the Committee for review and consideration shortly.

In the Advocates' study data from NHTSA's National Accident Sampling System (NASS) was examined for the years 1988 to 1989 to determine opportunities for head injury abatement. The NASS is a sample of police reported crashes which includes details on the nature and sources of injuries. Although it was found that injuries suffered by passenger car occupants were almost equally divided between restrained and unrestrained occupants, the injuries to unrestrained occupants were about twice as costly.

The study divides the "total harm" suffered by all restrained and unrestrained according to the part of the vehicle which caused the injury. For both groups, about 20 percent of the head injury harm was caused by the upper structures which surround the windows. In addition, another 30 percent - 40 percent of the head injury harm was caused by other vehicle components located close to the head.

NHTSA tests show that energy absorbing structures and components are highly effective in reducing head injury measures at impact speeds of 20 and 25 mph.

Using the results of NHTSA's reported research, it is estimated that the extent of overall head injury reductions which would result from energy absorbing interior components is 20 percent. Corresponding reductions in severe head injuries are 40 percent and 30 percent.

An annual benefit of more than 2000 lives saved is conservatively estimated for energy absorbing countermeasures when applied to the entire passenger car fleet. Reductions in severe head injuries are estimated at about twice the numbers for the fatality reductions with an additional 650 lives saved if the energy absorbing countermeasures were applied to vans and light trucks.

It is clear that we need to do more in preventing these seriously disabling and costly injuries. The most cost effective and humane approach to mitigate head injury is through improved motor vehicle crashworthiness. In order to reduce head injuries related to motor vehicle crashes:

(1) We support a requirement that NHTSA initiate rulemaking on a safety standard to reduce head injury caused by contact with the interior components of passenger cars and multi passenger vehicles.

(2) We urge the federal government to issue a rulemaking on rollover crash protection which results in the following improvements: strengthened space frame roof structure, modified structural components such as pillars and side rails, additional surface energy absorbing structures, safer door hardware and upgraded window glazing. These improvements are particularly critical for lighter weight and smaller cars. General Curry, NHTSA Administrator, has stated that with smaller cars "an increase in rollover rates could be expected * * * The reduced weight and shorter wheelbase leaves smaller cars more difficult to keep on the road in emergency maneuvers. And once off the road, they are more likely to roll over, which in turn increases the risk of fatal injury."

(3) We urge the federal government to initiate rulemaking which will lead to safety a standard for stability covering track width, wheel base and center of gravity to prevent rollover crashes, particularly in vans, light trucks and smaller cars. A congressional directive is necessary since NHTSA has denied a rulemaking petition by Senator Timothy Wirth and then granted a petition from Consumers Union to initiate such a rulemaking several years ago without any action since.

(4) We support a dynamic side impact standard to protect occupants against head injury in car-to-car crashes. The existing standard 214, in place since 1972, is only effective in protecting occupants in single vehicle crashes, into trees, poles and other stationary objects. The recent amendment to the standard is effective in car to car crashes only for the torso. It does not provide for protection against head injury. About 47 percent of side impact fatalities are caused by head injury.

PEDESTRIAN SAFETY

The second largest category of motor vehicle death after occupants, is pedestrians, according to the National Highway Traffic Safety Administration (NHTSA). In fact, according to NHTSA almost 7,000 fatalities and 150,000 serious injuries are suffered by pedestrians annually. Since 1977, fifteen to seventeen percent of all traffic deaths have been pedestrians. The saddest statistic of all is that about forty percent of all traffic-related deaths of 1 to 9 year old children are pedestrians according to the Insurance Institute for Highway Safety.

Although research has been done by the agency which examines ways to reduce pedestrian deaths and minimize injuries by making the automobile more forgiving through removing sharp edges and softening the underhood area, no rulemaking has been active for a decade to address the problem. Improvements to motor vehicle design could prevent more than 600 fatalities and thousands of injuries annually according to NHTSA. We support a congressional directive similar to language included in 5.673, introduced in the 101st Congress, directing NHTSA to begin and complete a rulemaking within two years to minimize pedestrian injuries attributable to vehicle design elements such as hoods, hood ornaments, fenders and grills.

A motor vehicle rulemaking on pedestrian safety was first issued in 1981. Ten years later there is still no action despite the fact that pedestrian fatalities are such a major source of harm on the highway.

SAFER ANTILOCK BRAKING SYSTEMS

Antilock brakes have been proven to be very effective in preventing wheel lock and loss of steering control in emergency stopping, particularly on wet roads. Antilock brakes also help the driver keep better control of the vehicle in a skid, and help prevent a motor vehicle from going off the road, a key factor in rollover crashes. Beginning in October 1991, Japan will require antilock brakes for heavy truck tractors and trailers manufactured for use in the transportation of hazardous mate-

rials. This rule coincides with a similar regulation taking effect in the European Economic Community requiring antilock brakes for heavy trucks, trailers and buses.

Here in the United States antilock brakes have been used on aircraft for years and are now sold on some luxury cars. With regard to trucks, NHTSA has embarked on a two-year, $4.5 million study of the durability and reliability of antilock brakes on heavy tractor trailers'. NHTSA indicates that the study will begin to yield useful data this spring.

The legislative and regulatory history of antilock brakes is a long and controversial one, fraught with stops and starts on rulemaking and congressional directives for action during the past 20 years. It is time the agency moved beyond field studies and began the necessary rulemaking requiring the installation of these brakes in all trucks, motorcycles and passenger vehicles. We support action by the agency to proceed with rulemaking as soon as possible. The action of Japan and the European Economic Community indicates worldwide acceptance for these brakes and we should not delay the availability of antilock brakes any longer.

BIOMECHANICS RESEARCH

In January of this year the Transportation Research Board released a report entitled "Safety Research for a Changing Highway Environment". The purpose of the TRB report was to examine how well the highway safety research community is prepared to address emerging safety issues related to highway and automobile safety and to capitalize on opportunities to find solutions. This year long study includes a package of recommendations for improving the scope, funding and management of future highway safety research activities. One of the major recommendations of the TRB study was for increased, multi-year funding for biomechanics research.

Biomechanics research is the study of injury mechanisms and human tolerance to crash impacts. It provides the basic knowledge to support the development of injury criteria and testing devices to create performance standards for testing vehicle crashworthiness. Biomechanics research supports agency rulemaking by developing criteria to measure the safety performance of new cars. The continuation of a strong and sufficiently funded program is the key to the next generation of agency rulemaking.

Many safety standards entail substantial implementation costs, so it is essential to know to what extent these investments would save lives and reduce injuries. The auto industry is critical of the criteria that NHTSA has proposed for testing injury in side impact crashes and maintains that the agency has overstated the safety benefits of the proposed standard. General Motors has offered alternative criteria, but federal funding of research on the biomechanics of injury has not been adequate to support the scientific studies and testing necessary to examine alternative measures and resolve these controversies.

Because biomechanics research has not received the level of funding that would support the necessary studies and testing to resolve these issues, it is likely that these and perhaps other regulations will be delayed without a more complete understanding of their safety benefits. We lobbied successfully last year to increase the NHTSA's biomechanics budget from $2 million to $5 million. However, for FY 1992 NHTSA has again requested only about $2.5 million for biomechanics research, and it appears the agency is using the $5 million in FY 1991 for a wide array of programs, not just biomechanics research.

The biomechanics research field is small with few trained scientists and engineers with background and experience in the mechanics and physiology of trauma. Reduced levels of federal support during the 1980's have diminished the government's capacity to sustain research and researchers in certain areas that are critical to advancing the knowledge base on which the safety community can effectively address the emerging safety problems of the next several decades. For example, the current deployment of funding for biomechanics research is inadequate to support the long-term testing and research needed to make major new breakthroughs in vehicle crashworthiness. We support the TRB recommendation that the federal government provide multi-year funding to establish at least one or two university centers of excellence to conduct long-term research in biomechanics. This research is critical to making further advances in injury mitigation and vehicle crashworthiness.

Findings in the study "Cost of Injury, A Report to Congress, 1989" indicate that each year about 57 million persons were injured. This translates to one in four U.S. residents. Motor vehicle injury is the fourth leading cause of death, but the leading source of years of life lost because so many young people are harmed in motor vehicle crashes. Yet, when one compares federal research expenditures, injury research spending (approximately $160 million) amounts to only 11 percent of National Can-

cer Institute obligations ($1.4 billion) and 17 percent of National Heart, Lung, and Blood Institute obligations ($930 million).

Research has played an important role in developing and evaluating key vehicle safety improvements of the last several decades and the payback has been spectacular. Since 1967, when the first motor vehicle safety standards were issued, over 150,000 lives have been saved. Yet the auto safety research effort has declined since the 1980's. Without congressional action to bring about some equity in how federal research dollars are spent in relationship to the leading causes of death and injury, such as motor vehicle crashes, the imbalance will continue. In fact, out of a total budget request of $52.9 million for research, NHTSA is proposing that only $8.2 million or about 15 percent be spent on research concerning vehicle crashworthiness. Furthermore, research for the vehicle injury control program is spread widely in small contracts that do not provide for the long-term testing and research needed to make further major advances in vehicle crashworthiness in a timely manner. I urge the Committee to consider this inadequacy when establishing the funding levels for the NHTSA authorization legislation. This research program should be doubled in our view.

OTHER LEGISLATIVE PROVISIONS

In addition to the four topics I have discussed this morning I would also like to briefly highlight other legislative provisions. Some of these provisions were contained in S. 673, the 1989-1990 NHTSA Authorization Bill, and others are safety-related measures which we urge be included in this year's authorization legislation.

Bumpers: We support a reinstatement of the NHTSA 1980 five mile an hour bumper standard within one year. Also, we support disclosure of bumper impact capability through manufacturer labeling of all new passenger motor vehicles. Advocates is also pursuing this legislative objective at the state level. Legislation requiring bumper quality disclosure has already been introduced in several states.

Child Booster Seats: We support federal adoption within one year of a new standard to increase the safety of child booster seats used in passenger automobiles.

Darkened Windows: Instead of a congressional directive requiring NHTSA to complete a study of the safety effects of darkened windshields and window glass in passenger automobiles, we support the issuance of an ANPRM within six months which applies to passenger vehicles and to vans and light trucks.

Crashworthiness Data: We support a study by the National Academy of Sciences (NAS) of methods for comparing motor vehicle crashworthiness and, if possible, the establishment of an objective system for determining and publishing accurate information on the comparative crashworthiness of different vehicle makes and models with labels on new vehicles to give consumers a safety choice when buying a new car.

Integral Head Restraints: The head restraint standard, issued in 1969, permits either adjustable or integral head restraints. A NHTSA evaluation of the standard a decade ago revealed that integral head restraints were 70 percent more effective and $28 cheaper, yet many companies still produce and sell adjustable head restraints. Also, the adjustable head restraint often does not provide sufficient crash protection. All cars should be required to have integral head restraints. If all cars, rather than less than half, had integral head restraints, it would eliminate over 100,000 injuries.

Research Safety Vehicle (RSV): We support funding of the Research Safety Vehicle program which produced the 1978 RSV. This vehicle shows that a 2500 pound car can crash safely at 40-50 mph and achieve high fuel economy and low emissions. This program was discontinued in 1981. It should be refunded as mandated in section 106 of the National Traffic and Motor Vehicle Safety Act.

On behalf of Tim Hoyt and myself, we appreciate the opportunity to appear before the Consumer Subcommittee today and commend your resolve in moving a NHTSA authorization bill. It has been ten years since a reauthorization bill has been enacted by Congress despite efforts by this committee to complete congressional action on the legislation. I, as well as the directors and staff of Advocates for Highway and Auto Safety, would be happy to work with you to advance this legislation toward final enactment during the 102nd Congress.

Senator BRYAN. Thank you very much. Mr. Ditlow, I'll hear from you now, sir.

STATEMENT OF CLARENCE DITLOW, DIRECTOR, CENTER FOR AUTO SAFETY, WASHINGTON, DC

Mr. DITLOW. Thank you, Mr. Chairman. With me today is Donald Friedman, President of MCR Technology and the former chief contractor for DOT's Research Vehicle Safety Program here on my left.

Vehicle safety standards are intended to build safety in the new vehicles, but it is the recall program that ensures consumers get the safety that they pay for in the standard. If a vehicle fails to meet a standard or contain a safety defect, the recall program forces manufacturers to recall the vehicles and remedy the defect or noncompliance.

From 1966 until 1987 the public could judicially challenge NHTSA's decisions to refuse to investigate. NHTSA was held accountable in the courts under an arbitrary and capricious review standard and could not arbitrarily close cases or deny citizens petitions. This is an essential check and balance on NHTSA failure to protect the public from safety defects. This check and balance was so effective that during these 20 years NHTSA was only sued twice. The first occurred in 1970 when Ralph Nader obtained an order that an investigation closed with a partial recall be remanded with instructions to complete the investigation. Mr. Nader obtained this court order because the engineering report from the defects office conflicted with the partial recall by finding all the vehicles were defective.

The second case was in 1988 when we challenged NHTSA's denial on petitions. The court upset this careful check and balance on NHTSA by ruling that the agency's decisions to deny petitions are committed to agency discretion and are not reviewable. NHTSA has interpreted this case to extend to its decision to close investigations as well.

As a result, the check and balance under NHTSA has vanished. If Mr. Nader were to go to court today with a engineering report from the defects office showing all vehicles had a defect rather than just a fraction recalled, the court would not hear the challenge or review the evidence showing a defect. Without this check and balance, NHTSA can close investigations or refuse to open investigations without regard to the merits.

We have a recent example where NHTSA refused to grant our request to open an investigation of throttle failures. NHTSA told us the reports were random and isolated, yet 5 months later the manufacturer recalled these vehicles for the very defect pinpointed by us and which NHTSA said didn't exist. Even though we knew we were right as a subsequent recall proved, we could not challenge NHTSA's refusal to investigate. If the manufacturer had not done the right thing, these defective vehicles would still be on the road.

CAS strongly recommends that a provision for judicial review of the agency's decision to deny petitions and proposed investigations be enacted to restore the needed check and balance.

In the area of rulemaking, NHTSA still has a long way to go. NHTSA gives the appearance it is doing everything that needs to be done, but in reality important lifesaving matters, such as rollover, dynamic side-impact testing for trucks have not even been

proposed as rules. In addition, rules that have been proposed as much as three years ago have remained stagnant.

A congressional mandate such as under consideration in the authorization bill would impose deadlines on these rules remains vital to the cause of auto safety. I don't think you could have a hearing every week with Mr. Curry to get him to do the right thing, so we would like to see the legislation passed.

Among the missing final rules are some of the ones with the biggest payoff. The agency has failed to issue a final rule on head injury and side impact which accounts for 30 percent of the fatalities in side crashes, nor has it moved on its related proposal to upgrade standard 201 with padding for headers, frames, and pillars.

When it comes to side-impact protection, light trucks and vans have it worse. The old static side-impact standard which NHTSA proposed with such fanfare has not been made final and there is no proposal pending whatsoever to extend the badly needed dynamic standard of these vehicles.

Unless Congress forces NHTSA to act, the 21st century will be here before NHTSA finally extends equal safety protection to light trucks and vans that exist in cars. NHTSA recognizes that rollover is a serious problem with 10,000 people killed each year. Although they promised the rollover stability rule by the fall of 1990, it has not yet done so. More importantly, NHTSA has not taken action on a rollover crashworthiness standard. Simple, inexpensive technology exists to sharply reduce death and injury in rollover so that NHTSA's inaction is all the more inexcusable.

Finally we note that NHTSA has criticized proposals to increase fuel economy standards to 40 miles per gallon by the year 2001 as adversely affecting auto safety. The center and MCR Technology has just issued this report, "The Safe Road to Fuel Economy," a copy of which we would like to submit for the hearing record. It found the auto industry could meet a 40-mile-per-gallon standard with improved safety over today's levels. Our study determined that the auto industry could meet this 40-mile-per-gallon standard with the same mix of cars on the road today and with no shift to smaller cars. The larger cars were kept with minor weight reduction, but we would keep the small cars at the weight they are today. With the inclusion of full front seat bags for all cars plus upgrading the airbags that you see to better ones, advanced airbags in the future, auto occupants fatalities and injuries will be 10 percent lower than today while the new car fleet achieves a 40-mile-per-hour standard.

The upgrade of standard 208 as we propose in the study would eliminate any disparity between small and large cars with a further 10 percent reduction in occupant deaths and injuries. We cannot help but point out the inconsistency between NHTSA's failure to act on advanced safety standards such as 208 and dynamic side-impact testing with its criticism of CAFE. If we act on these we can take care of any problem that NHTSA sees and improve the safety of vehicles for Americans. With the utilization of feasible advanced safety and fuel economy technology, we can build a fleet of American cars and foreign cars that will save lives and gasoline. Thank you.

Senator BRYAN. I would thank you very much, Mr. Ditlow, and your report will be made a part of the record of this proceeding.

Mr. DITLOW. Thank you.

[The prepared statement of Mr. Ditlow and report entitled "The Safe Road To Fuel Economy" follow:]

PREPARED STATEMENT OF CLARENCE M. DITLOW

Mr. Chairman, members of the Committee, thank you for the opportunity to testify on authorization of the National Highway Traffic Safety Administration (NHTSA). The Center for Auto Safety is a non-profit organization founded by Consumers Union and Ralph Nader in 1970 but is now independent of both. With me today is Don Friedman, President of MCR Technologies and the former chief contractor for the Department of Transportation's Research Safety vehicle Program.

SAFETY DEFECTS AND RECALLS

Vehicle safety standards are intended to build safety into new vehicles but it the recall program that ensures consumers get safety. If vehicles fails to meet a standard or contains a safety defect, the recall program forces manufacturers to recall the vehicles. NHTSA's carries out its recall program through defect and non-compliance investigations.

From 1966 until 1987, the public could judicially challenge NHTSA's decisions to refuse to investigate cases or to close out investigations without a recall. NHTSA was held accountable in the courts under an arbitrary and capricious review standard and could not arbitrarily close cases or deny citizen petitions. This was an essential check and balance on NHTSA's failure to protect the public from safety defects.

This check and balance was so effective that during these 20 years, NHTSA was only sued twice. The first occurred in *Nader* v. *Volpe,* Civ. Act No. 960-70 (June 26, 1970), where Ralph Nader obtained an order that an investigation closed with a partial recall should be remanded to the agency with instructions to complete the investigation. Mr. Nader obtained this court order because the engineering report from the defects office conflicted with the partial recall by finding all the vehicles were defective. As a result of that order, all GM trucks with defective Kelsey-Hayes wheels were recalled and not just those with camper bodies. The second case was *Center for Auto Safety* v. *Dole,* 846 F.2d 1532 (1988), in which CAS challenged NHTSA's to deny our petition under Section 124 of the Safety Act to open an investigation in to Ford vehicles whose transmissions jump from park to reverse. The court upset this careful check and balance on NHTSA by ruling that the agency's decisions to deny petitions to open investigations are committed to agency discretion and are not reviewable. NHTSA has interpreted this case to extent to its decision to close investigations as well.

As a result, the check and balance on abuse of discretion in NHTSA investigations has vanished. If Mr. Nader were to go to court today with an engineering report from the defects office showing all vehicles of a particular model had a defect rather than just a fraction recalled, the court would not hear the challenge or review the evidence showing a defect.

Without this check and balance, NHTSA can close investigations or refuse to open investigations without regard to the merits of the case. A glaring recent example occurred in when NHTSA refused to grant the Center's July 13, 1990 request to open an investigation into throttle failures on Jeep Cherokees that resulted in unintended acceleration. NHTSA told us that the reports we forwarded were "random, isolated" ones. Yet five months later, Chrysler recalled these vehicles for the very defect pinpointed by CAS and which NHTSA said didn't exist. Even though we knew we were right as the subsequent recall proved, we could not challenge NHTSA's refusal to investigate.

This is but one of many cases where NHTSA has refused to open or has closed investigations without ordering recalls since the 1988 court decision. In a September 1990 report, GAO confirmed CAS testimony before this Committee in April 1989 that NHTSA had in fact closed 37 defect investigations without obtaining a recall when the manufacturers refused to do a voluntary recall. Without the check and balance of a possible citizen suit over agency inaction on safety defects, NHTSA has a harder job overcoming auto company refusals to recall. CAS strongly recommends that a provision for judicial review of the agency's decisions to deny defect petitions and close investigations be enacted to restore the needed check and balance on the agency's actions in the area of defects and recalls.

SAFETY STANDARDS

Despite the issuance of four important rules since 1988, NHTSA has a long way to go in promulgating important standards. NHTSA gives the illusion it is doing everything that needs to be done with rulemaking but in reality important, life-saving matters such as rollover and dynamic side impact testing for trucks have not been proposed as rules. In addition, rules that were proposed as much as three years ago have remained stagnant. A congressional mandate that would impose deadlines on these rules remains vital to the cause of auto safety.

Since 1988 NHTSA has undertaken the following major rulemaking activities:

PROPOSED RULES

- FMVSS 201—Occupant Protection in Interior Impact: Each year 3000 people are killed and 8000 seriously injured from hitting unpadded interior surfaces such as window frames, windshield headers and A-pillars during an accident. In August 1988 NHTSA announced an Advanced Notice of Proposed Rulemaking (ANPRM) to upgrade FMVSS 201 that would require additional padding on such surfaces.
- FMVSS 214—Side Impact Protection: Each year 1400 people are killed and 6000 are seriously injured when Multipurpose Passenger Vehicles, such as Minivans, Utility Vehicles and Pickups are subject to side impact crashes. Currently these vehicles are exempt by NHTSA from meeting any standard for side impact crashworthiness. In August 1988 NHTSA announced an ANPRM followed by a Notice of Proposed Rulemaking (NPRM) in December 1989 that would require these vehicles meet FMVSS 214, which cars have had to meet since 1973.
- FMVSS 214—Side Impact Protection: Each year 8000 people are killed and 23,000 seriously injured during side impact collisions. 30 of all motor vehicle occupant deaths occur in side impact crashes with head injuries as a major cause. In August 1988 NHTSA announced an ANPRM to set head injury performance requirements for FMVSS 214.
- FMVSS 206—Door Retention: Each year 3500 people are killed when doors open during accidents and occupants are ejected from their vehicles. In August 1988 NHTSA announced an ANPRM to upgrade FMVSS 206 and require vehicles to have stronger door latches. The NPRM announced January 1988 to upgrade FMVSS 214 would also require that doors remain closed during the dynamic crash tests. Improving door latches would cost as little as $1 per door.
- FMVSS 216—Roof Strength: Each year 3800 people are killed in light truck (MPV) rollover accidents. Although light trucks have a far higher rollover rate than passenger cars, NHTSA sets no roof strength standard for them. In November 1989 NHTSA announced a NPRM that would require light trucks to meet FMVSS 216 that has applied to cars since 1973.
- FMVSS 108—Middle Stop lamp: Each year 30,000 people are injured in rear collisions involving light trucks (MPV's). Since 1986 passenger cars have been required to have center mounted rear brake lamps. NHTSA announced a NPRM in May 1990 to require the stop lamps on light trucks.
- FMVSS 301—Fuel System Integrity: In May 1988 28 people were killed in a fiery school bus accident in Kentucky in which the gas tank ruptured. In March 1989 NHTSA announced an ANPRM to upgrade FMVSS 301 on school buses.
- FMVSS 213—Child Safety Seats: NHTSA announced a NPRM February 1991 that would require child seat registration.FINAL RULES
- FMVSS 202—Read Restraints: Each year 17,800 people suffer whiplash injuries in light trucks (MPV's) which are not required to have head restraints. In September 1989 NHTSA issued a final rule requiring all light trucks to have front seat head restraints beginning September 1991.
- FMVSS 208—Automatic Crash Protection: Each year 8000 people are killed while driving a light truck (MPV). While one of every three vehicles on the road is a light truck, these vehicles are exempt from having airbags or automatic seatbelts which have been phased in on cars beginning in 1986. In March 1991 NHTSA issued a final rule requiring automatic crash protection for MPV's to be phased in beginning September 1994.
- FMVSS 208—Occupant Crash Protection: Up to 50- of rear seat occupant injuries would be prevented if all vehicles had rear seat lap and shoulder belts. Although passenger cars have been required to have them since 1990, MPV's have been exempt from meeting the standard. In November 1989 NHTSA issued a final rule requiring rear seat lap and shoulder belts for MPV's, convertibles and small school buses beginning in September 1991.
- FMVSS 214—Side Door Strength: Expected to ultimately prevent 500 deaths and 25,000 injuries each year, NHTSA issued a final rule in October 1990 setting the first dynamic side impact crash test standard for passenger cars. However, the

rule only sets requirements for the torso and pelvis and not the head, a source of far more injuries. In addition, the rule will not apply to all new cars until 1997.

TERMINATED RULES

• Heavy Truck Splash and Spray: The Surface Transportation & Uniform Relocation Assistance Act of 1987 required NHTSA to set minimum splash and spray requirement for heavy trucks traveling in wet weather which has been found to significantly reduce visibility for other motorists on the road. Spray suppressant flaps and side skirts would be the technology of choice. Deciding it could not be done, NHTSA terminated the rulemaking in May 1988.

Since 1988 the following safety issues have not received the rulemaking attention needed to prevent the thousands of ensuing deaths and injuries each year.

NO RULEMAKING ACTION

• Rollover: Each year 10,000 people are killed in rollover accidents. Small cars and utility vehicles such as Jeeps are particularly prone to rollover. To determine if rulemaking would be appropriate, NHTSA began studying the matter in 1988 and had planned to decide on a proposed rule by Fall 1990 but has not yet done so.

• Bumpers: At just 5 MPH bumpers on 22 popular 1991 cars suffer $600-3000 worth of damage Since 1982 when NHTSA downgraded the bumper protection standard from 5 to 2.5 MPH minor impacts have cost consumers huge sums of money. For example, when Buick put the weaker bumpers on its 1984 Regals, insurance claims rose 21%. Light, 5 MPH bumpers are available today on some cars but NHTSA refuses to make them mandatory.

• Battery Explosions: Each year 6300 people are injured in battery explosion accidents. One estimate puts the number injured between 1981-86 at 100,000. Many injuries could be prevented if batteries had a protective shield. In October 1989 NHTSA rejected a petition that would require such shields.

• ASS 214—Side Impact Protection: Although 1400 people are killedeach year in light truck (MPV) side impact accidents, there is no current rulemaking for a dynamic crash test standard to prevent head injuries in this crash mode. Such rulemaking began only for passenger cars in August 1988.

SAFETY STANDARDS AND SMALL CARS

NHTSA has criticized this Committee's passage of 5. 279 to increase CAFE standards to 40 MPG by 2001 as adversely affecting auto safety. CAS and MCR Technologies just issued "The Safe Road to Fuel Economy" on April 9, 1991, a copy of which is submitted for the hearing record, that found the auto industry could meet a 40 MPG CAFE standard with improved safety over today's levels. CAFE standards have had a beneficial effect on auto safety by spurring the manufacturers to phase-out less safe and less fuel efficient models such as the Ford Pinto and replace them with more fuel efficient and safer models such as the Escort. As CAFE has doubled since 1974, the traffic death rate has dropped by 40%.

Our study determined that the auto industry could meet a 40 MPG standard by 2001 with the same mix of cars on the road today and with no shift to smaller cars. With the inclusion of full front seat airbags for all cars and implementation of the dynamic side impact standard adopted by NHTSA, auto occupant fatalities and injuries will be 10% lower than today while the new car fleet achieves a 40 MPG CAFE level. By upgrading FMVSS 208 to include 450 angled barrier test and rollover criteria for all cars along with a 40 MPH test speed for all side impacts with 40 MPH frontal for small cars, any disparity between small and large cars could be eliminated with a further 10- reduction in occupant deaths and injuries as shown in the table below from our study.

We cannot help but point out the inconsistency between NHTSA's failure to act on advanced safety standards and it criticism of CAFE. For ten years, NHTSA has stalled on issuing rollover standards. NHTSA terminated rulemaking in the 1980's to upgrade the crash test speed of FMVSS 208. Rollover crash protection is long overdue. The safety proposals in our study should be adopted independent of CAFE. The issue is why NHTSA has not acted on these safety issue rather than to just use them to criticize CAFE. With the utilization of feasible advanced safety and fuel economy technology, we can build a fleet of American cars that will save lives and gasoline.

Projected Annual Fatalities and Injuries From FMVSS 208 and Adding FMVSS 214

Year	Fatalities	Fat./100 M VMT	Fat. and Inj. in cars by AIS				
			Serious injuries	6	5	4	3
1990	44,500	2.1	394,000	28	36	36	294
1995	42,500	2.0	360,000	26	30	30	274
2000	40,000	1.8	340,000	24	27	28	251

Estimated Annual Fatalities and Injuries From Proposed Changes in FMVSS 208

Year	Fatalities	Fat./100 M VMT	Fat. and Inj. in cars by AIS				
			Serious injuries	6	5	4	3
2000	36,000	1.6	300,000	22	20	26	232

THE SAFE ROAD TO FUEL ECONOMY

(By MCR Technology, Inc., and Center for Auto Safety)

This paper considers and explains the 1975 projected and 1990 actual Safety and Fuel Economy of Small cars and characterizes for 1996 and 2001 reasonably modified regulations which would result in improvements consistent with industry potential and consumer demands for the safety and fuel economy of various size cars, with practical modifications to current vehicles. An estimate of the resulting reduction of casualties and improvement in fuel economy is provided.

In 1975 NHTSA's Research Safety vehicle (RSV) Program established the analytical framework for assessing present and future auto safety gains. The 1975–1980 Minicars RSV and Large Research Safety vehicle (LRSV) program established a baseline for quantifying the effects on injuries and fatalities of design alternatives applied to current 1990 cars for future production.

Estimates are coupled with recent and more sophisticated accident data, the results of the later RSV prototype design Phases, published safety studies in the intervening period, recent regulatory implementations, manufacturer's confidential design efforts and production of safety improvements, and some 200 detailed severe injury accident investigations of the past seven years.

The results indicate that with modest, achievable regulatory changes (FMVSS 208 frontal and 45-degree angled 35 mph barrier impacts, the S8.3 rollover and a 40 MPG CAFE), vehicular fatalities and injuries will continue to decline, the disparity between small and large car and light truck safety can be ameliorated, while manufacturer's simultaneously improve fuel economy 40 by 2001.

INTRODUCTION

The objective of this paper is to provide an engineering basis for understanding the historical trends, current status and future consequences of Safety and CAFE regulations (Figure 1, 2).

FIGURE 1. U.S. TRAFFIC FATALITY TRENDS 1974-1990

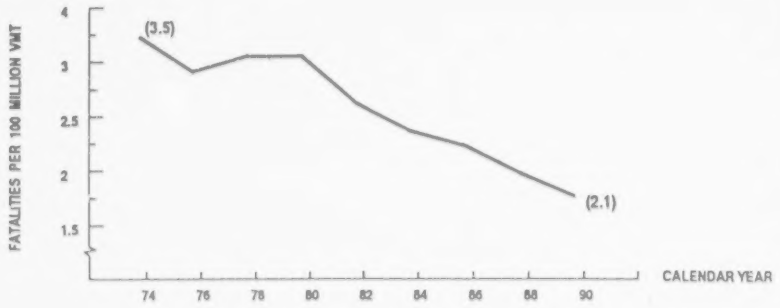
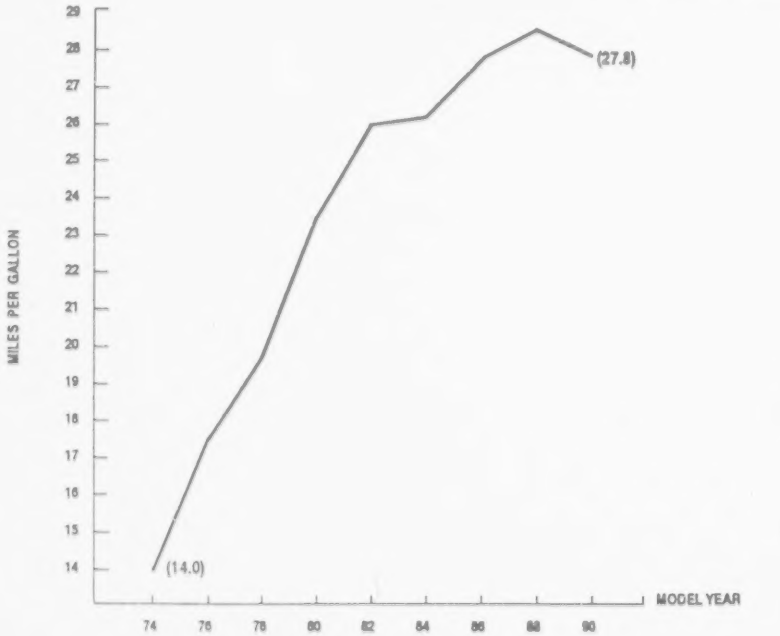


FIGURE 2. AUTO FUEL ECONOMY TRENDS 1974-1990



It is based on the Background History of Regulation in Safety and CAFE; relevant perceptions of the American consumer and Auto manufacturers; the historical and current accident and injury population and distribution; the available structural, restraint and interior design alternatives and their cost; and the fuel economy by Size class and of current individual Vehicle, Engine and Transmission combinations.

These factors are used to compare the ability to achieve and the consequences of reasonable and consistent Safety and CAFE regulatory goals for 1996 and 2001.

SAFETY BACKGROUND

In 1974, most accidents were between two fairly large cars trying to avoid each other. Of the 125 million vehicles (100 million cars and 25 million trucks) then on our roads, as many as 25 million were involved in 16 million accidents,[1] though only 12 wore belts, about two million people were injured. Most were minor injuries, about 101,000 were serious and life threatening, about 30,000 were permanently

disabling, and 28,000 died.[2] The Corporate Average Fuel Economy (CAFE) was at about 14 mpg, average new car weight was 3,968 lbs., the average fuel economy of the total on-the-road fleet was about 12 mpg and emissions were well over EPA standards with average lifetime emissions for 1974 models being 4.18 grams/mile for Hydrocarbons, 3.11 for Nitrogen Oxides and 45.49 for Carbon Monoxide.

In 1990, most accidents are between different sized vehicles trying to avoid each other. More than 40% of the occupants of the 190 million vehicles (145 million cars and 45 million trucks) on our roads wear belts, but there are still about two million injured. Again most are minor injuries, but about 210,000 are serious and life threatening, about 70,000 are permanently disabling, and 28,000 die.[3] The CAFE[4] is about 27.8 mpg, average new car weight is 3,178 lbs. and the average fuel economy of the total on-the-road fleet is about 19 mpg and emissions have been greatly reduced by 85% to 0.63 grams/mile for Hydrocarbons, 0.71 for Nitrogen Oxides and 6.88 for Carbon Monoxide for 1991 models.

In 1980 the safety and fuel economy performance of the Minicars Research Safety Vehicle[5] and the Large Research Safety Vehicle were validated by independent tests. Their specifications and those of the Calspan/Chrysler RSV were published by NHTSA in 1978.[6] These vehicles demonstrated what could be achieved, but clearly NHTSA and the, Industry on behalf of the Consumer, chose not to require such performance in production during the eighties and not much can change before 1996.

On the other hand: more than 50% of the vehicles are now small, the percentage of people wearing their belts has increased from 12% to about 47%, the total U.S. population has increased 20%, new safer cars are being added at about 10 million per year and scrapped at about 6 million per year, while trucks are being added at about 4 million and scrapped at about 1.5 million per year, the number of vehicles[6] has increased 50% and the number of people killed per one hundred million miles driven or per vehicle has decreased dramatically.

During the 1970's, Japanese manufacturers, the first major producers of small cars, took advantage of the lack of occupant protection test requirements and U.S. manufacturers used scaled structural designs for their small size cars (like the Chevette), which for a principally unrestrained occupant population, led to the conclusion by the end of the decade that big cars were safer than small ones. The RSV program demonstrated (Figure 3) in 1975, that if the design of cars and use of restraints didn't change, the societal cost of accidents in 1985 would. Fortunately, in the 1980's dynamic tests were mandated, structures were no longer simply scaled, interior occupant protection was enhanced and restraints began to be used.

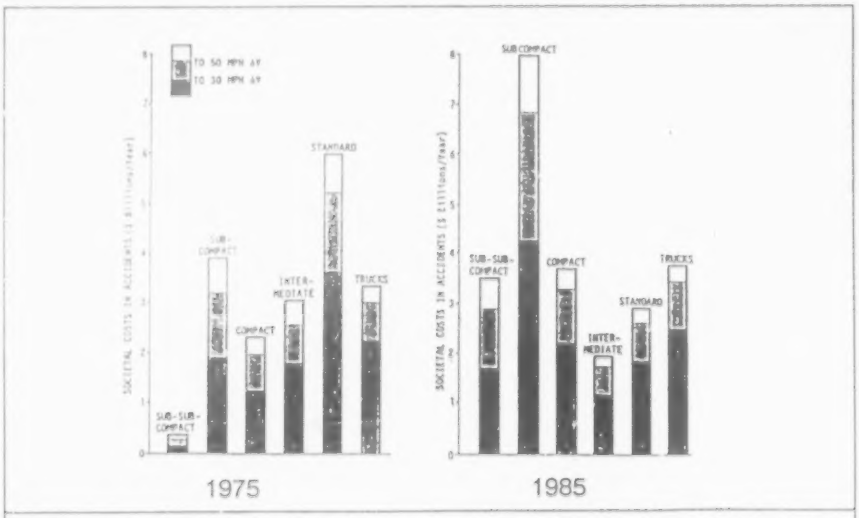


Figure 3. SOCIETAL LOSSES BY VEHICLE SIZE CLASS AND DELTA VELOCITY FOR 1975 AND PROJECTED TO 1985

In 1974, Minicars demonstrated that with a small weight increase and advanced high performance airbags, even the Ford Pinto, could protect occupants to 50 mph.[2] The Escort which replaced the Pinto has a much lower fatality rate record but would have been much safer still if it had utilized an advanced airbag system.

In 1980 we demonstrated 40 mph protection for driver and passenger without structural modification in the Chevrolet Citation and Impala in the LRSV a 900 pound weight reduced Chevrolet. In the Modified Production Vehicle program[7] with the Citation, we were able to show that unrestrained occupants could be protected to 25 mph. General Motors also showed that its replacements for the notoriously bad performing Chevette, the J-Car series (Cavalier, etc.), could protect unrestrained occupants to 25 mph.

Ford and General Motors had designed and tested these vehicles with airbag installations, which they never put into production. In other words, if available technology in the late 1970's had been applied small cars could and would provide the same protection as large vehicles to some common level of severity.

Clearly, small cars need not be less safe and in reality in 1990 when restraints are worn, they are not less safe except in the small percentage of high severity crashes. The high severity exception is because in the past NHTSA constrained itself to require uniform performance standards for all vehicles by requiring dynamic fixed barrier impact tests instead of vehicle to vehicle or moving barrier tests as NHTSA proposed but then dropped after 1980. And unfortunately, a 30 mph frontal barrier test is not equally representative, of the protection requirements for the occupants of small and large vehicles, at the highest severity or the most intrusive mode of the majority of vehicle to vehicle accidents.

After the passage of the CAFE law, the auto companies had a unique opportunity to incorporate advanced auto safety as they spent $80 billion to build a whole new generation of cars. And the new cars were safer than the ones they replaced (Escort vs Pinto and J-Car vs Chevette). But a comparison of the redesigned vehicle configurations before and after at General Motors, indicates that safety wasn't a prime concern. The redesigns had several objectives, including: a shift to transverse front wheel drive and unitized bodies, reducing weight for fuel economy, maintaining interior volume, repositioning models for EPA compliance tests and competitive reaction to a loss of market share. Except for providing FMVSS 208 injury criteria protection to restrained dummies in 30 mph frontal barrier tests, safety was secondary.

When Congress passed the CAFE law, it created a significant incentive for the car companies to phase out older, less fuel efficient vehicles which were also unsafe. while many of the replacement vehicles had major advances in fuel efficiency, most had only moderate improvements in safety and none utilized the advanced safety features available to the manufacturers and discussed in this study. Table 1 lists exemplary models and their replacements in the late 1970's and early to mid-1908's that show these vehicles improved in gas mileage while also making moderate improvements in safety as demonstrated by their lower death rates per 100 million VMT and their crashworthiness as measured in NHTSA's 35 MPH NCAP crash tests.

Table 1.—Small Car Fatality Rates and NCAP Crash Scores by Manufacturer

Model	Curb wt., pounds	Wheelbase, inches	Head injury, driver/passenger	Deaths per 100MM VMT	CAFE mpg
Calendar Years 1985–89					
Honda:					
1979–80 Civic	1760/1850	87/89	2030/2093 (1979 2D) 2626/1506 (1980 2HB)	2.64	32.4/34.7
1981–82 Civic	2000/1965	91/91	607/492 (1981 2HB)	1.47	36.1/39.6
Toyota:					
1981–82 Tercel	2050/2050	98/98	1218/1179 (1980 2D)	2.32	35.8/35.4
1984–85 Tercel	2145/2145	96/96	658/492 (1984 4HB)	1.37	38.7/38.2
1980–81 Corolla	2000/2000	95/95	838/1162 (1980 4D)	2.31	30.4/31.1
General Motors:					
1984–85 Chevette	2200/2200	97/97	1886/1306 (1984 4HB)	2.46	34.7/35.0
1986–87 Nova	2250/2250	96/96	552/562 (1986 4HB)	1.20	36.1/36.1
Calendar Years 1981–82					
Volkswagen:					
1973–74 Beetle	1950/2025	95/95	NA	3.79	26.0/26.0
1977–78 Rabbit	1940/1940	94/94	1024/429 (1979 2HB)	2.11	32.5/32.8
Ford:					
1975–76 Pinto	2590/2570	95/94	NA	3.40	26.3/26.3
1981–82 Escort	2050/2090	94/94	618/1011 (1981 2HB)	2.18	32.4/33.8

In each case, the CAFE of the replacement vehicle went up by 5–20% while the fatality rate went down 30–50%. One of the best examples of combined improvement in gas mileage and safety is the replacement of the VW Beetle by the VW Rabbit. The Rabbit was a lighter vehicle with a shorter wheelbase yet had a 44% drop in death rate and a 25% improvement in gas mileage. The Rabbit's dramatic improvement was due in large part to Volkswagen being one of the few manufacturers to incorporate features from its Experimental Safety Vehicle into production vehicles like the Rabbit.

Structural design to resist intrusion in foreseeable offset and angled impacts and provide protection at frontal injury criteria levels was simply not an objective. Since there was no applicable dynamic protection standard for side or rollover impacts, "engineering judgment" determined that padding which could reduce head, neck and upper torso injuries and compensate for the lighter structure in the sides and roof was unnecessaryIn other words, not paying attention to protecting people increases casualties.

All cars are only as safe as they are required to be. But due to manufacturers taking advantage of loopholes in regulations, they are nowhere near as safe as consumers believe standards require them to be. For instance, although belts were required in cars since the early 1970's, it wasn't until 1987 that manufacturers were required to certify that they provided protection in an impact. Even today manufacturers are only required to protect tightly belted, average size occupants in frontal accidents to 30 mph.

But with comfort feature (window shade) belts most people are loosely belted, many Americans are somewhat overweight, many accidents are not frontal and not under 30 mph. All these factors lead to occupant movement into contact with interior surfaces, the result of which is that too many people wearing belts (that they think will protect them) receive Severe, Critical and Fatal injuries.

During 1990 and 1991 two significant Regulatory changes have been made which will have a significant impact on future casualties if fully implemented. NHTSA has implemented a dynamic side impact test in FMVSS 214 and announced that Light Trucks and Multi-purpose Vehicles must in the future, meet automotive performance standards from which they were previously exempt. The impact on CAFE of the expected 50 pound weight penalty is negligible.

To realize the full protection of these measures, NHTSA must issue a Final Rule for head injuries as part of FMVSS 214 and must issue Final Rules for Light Trucks and Multi-purpose Vehicles, for dynamic side impact and rollover which have not been done. The history of NHTSA is replete with good proposed rules that never become final.

Of the 47% of the people who wear their belts, how many wear them low and tight across their laps, how many are not overweight, how many impacts are with other cars and at intersections, how many head-on impacts are at 30 mph with the vehicles intentionally lined up centerline to centerline, how many are side or rear impacts and/or rollovers for which no protection is yet required? what is the role of the driver in establishing fatality rates by car make and model? How will airbags change the picture? The answer to these and many other questions will characterize future casualties.

FUEL ECONOMY BACKGROUND

Since the oil crisis of 1974 new car demand has changed the size distribution of the U.S. fleet and new car demand by size is now stabilizing. CAFE has affected the mix of vehicle sizes offered for sale by individual manufacturers. The largest and smallest classes have shrunk while the intervening size classes have grown in sales. The mini-class dropped out of the market going from 11.4% in 1974 to 0.8% in 1990. The large car class went from 21.3% to 12.7% of the market. The overall effect has homogenized the vehicle with large cars getting smaller and small cars getting larger

when one analyzes the CAFE improvement from a level of 14.0 MPG in 1974 to 27.8 MPG in 1991, one finds that 86% resulted from technological improvements to passenger cars. In 1974, the average new car fleet inertia weight was 3968 pounds. In 1991, the average was 3178 so the average car dropped 790 pounds or 19.9% in weight. Since every 10% reduction in weights yields a 6.6% increase in CAFE, the increase in CAFE due to weight loss from 1974 was only 13.1% Using Oak Ridge National Lab CAFE data took the 1976 mix and superimposed it on the 1991 fleet. DOE found that the 1991 fleet had only improved its CAFE by 0.2 MPG due to mix shift. Of the total CAFE increase of 13.8 MPG since 1974, 1.8 MPG was due to weight loss, 0.2 MPG due to mix shift and 11.8 MPG or 86% due to technological improvements. If we had traded out engine performance improvements for CAFE

gains versus faster acceleration times, we would have had a 1991 CAFE of 30.3 MPG for a gain of 16.3 MPG with 14.3 MPG or 88% coming from technological improvements.

For a given population of cars there is no relationship between CAFE and current levels of Safety. The safety of vehicles has been demonstrated to be easily improved from current levels with significant weight reductions . Safety is related to structural crashworthiness and occupant protection design alternatives, while fuel economy is related to engine and transmission efficiency, power to weight ratio, acceleration performance, drag coefficient and vehicle size (which has weight implications).

A technological improvement in engine performance and efficiency can be used to improve acceleration or fuel economy. But, acceleration is thought to sell cars.

The truth is:

We can address increased CAFE Standards and improved occupant Safety protection individually, because practical technology is available at reasonable cost to do either or both and both are deserving of our attention.

A reasonable relationship between Safety and CAFE standards can be fabricated but the results will be dependent on the factors considered. History and reality would suggest that a consistent and positive relationship has, can and will continue to exist.

Based on where we are today, only a virtually impossible production mix of vehicles, combined with an irrational disregard for safety considerations which is not in evidence, could reverse and adversely effect the gains in safety of the past twenty years.

CHARACTERIZING CONSUMERS AND MANUFACTURERS

Manufacturer's design and produce cars either to create or satisfy new car market demand, while meeting imposed regulations. Design changes are generally to reduce cost and/or maximize perceived value and profits. Manufacturer's statements about what can be done are based on the perspective that current designs are the result of near perfect satisfaction of customer market surveys.

Cars are reasonably safe when measured by dummy injury-measure compliance with Federal Motor Vehicle Safety Standards and are unsafe when measured by their ability to protect real world car occupants from injury and fatality in foreseeable accidents with the technological state of the art of the past twenty years.

More specifically, with regard to CAFE standards, U.S. car models are designed to the industry's perception of the customer's desires in looks, power and performance in each market segment, while production and marketing is geared to sell enough of the "right" cars to meet CAFE requirements. Many Japanese car models are designed with an engine just sufficient to meet adequate but minimum consumer acceleration expectations. U.S. consumers thrive on and buy variations, so the range of alternatives of vehicle size, acceleration performance, handling and accommodations cannot be regulated.

The manufacturer's perception is that, increased fuel economy doesn't sell except in times of high fuel costs. In Europe, more than a dollar a gallon tax on gasoline is an effective consumer incentive for reduced fuel consumption cars. But at current American gasoline prices, high performance even at increased cost and fuel consumption still sells.

Regulators who visualize the national and environmental benefits of improved automotive fuel economy and attempt to use the mechanism of increased CAFE requirements to accomplish it are counteracted by representatives of the U.S. manufacturer's perspective who see it mostly as forcing a change in the sales distribution, favoring cars they don't think the public wants to buy and they have a hard time selling.

It is reasonable to presume that a manufacturer's priority is to design and produce cars that sell—and meet all regulatory requirements. It is therefore understandable that they would resist any public policy (whatever the regulatory change mechanism) which forces them to produce what they perceive as competitively less saleable cars. when the public is thought to value fuel economy as they now (twenty years later) value reduced emissions, air bags and anti-lock brakes, manufacturers will gladly supply it.

Perhaps the role of public policy debate is to gradually adjust public sentiment towards acceptance of socially desirable change even at disproportionate individual cost. But the debate and implementation should be founded in basic engineering principles and technical truths not in rhetoric and perceptions as advanced by opponents of increased CAFE standards.

CHARACTERIZING THE ACCIDENT AND INJURY POPULATION

Accident Statistics—Since the Highway Safety Act of 1966, the fatality rate for all vehicles has declined 50% while fuel economy has doubled. Yet the number and percentage of small cars (with relatively high fatality rates and fuel economy) in the vehicle population has increased dramatically. The more recent reasons for this seeming contradiction are: the greater use of the available restraints, particularly in small cars, the greater number of mid-size cars, the 1977 to 1986 reduction in the number and weight of large cars and the introduction of "passive (padded) interiors."

Table 2, taken from NHTSA evaluations of the effectiveness of Safety Standards, shows reductions in deaths and injuries attributed to regulated safety improvements from the mid-1970's to the mid-1980's.[35]

Table 2.—Benefits of Vehicle Safety Improvements Mid-1970's vs. Mid-1980's

[Annual savings]

Improvement	Lives	Injuries
Front padding	700	Unknown
Head restraints	Unknown	64,000
Steering assemblies	1300	23,000
Windshields	105	47,000
Door retention	400	Unknown
Roof strengtn	110	Unknown
Side protection	480	400
Child safery	192	Unknown
Fuel tanks	400	520
Brake improvement	324	29,700

1979 testimony[11] included estimates of the relative number of injuries by severity and accident mode (area of damage) in 1975, reproduced here as Figure 4. The Abbreviated Injury Scale (AIS) is the engineering description of the level of medical injuries. AIS=1 is minor, 2=moderate, 3=serious, 4=severe, 5=critical, 6=fatal. These charts illustrated the 1975 priority need for frontal and frontal angled offset impact protection with 15% restraint usage.

FIGURE 4. 1975 DISTRIBUTION OF INJURIES BY MULTI-DISCIPLINARY ACCIDENT INVESTIGATION (MDAI) DAMAGED AREA AND AIS LEVEL

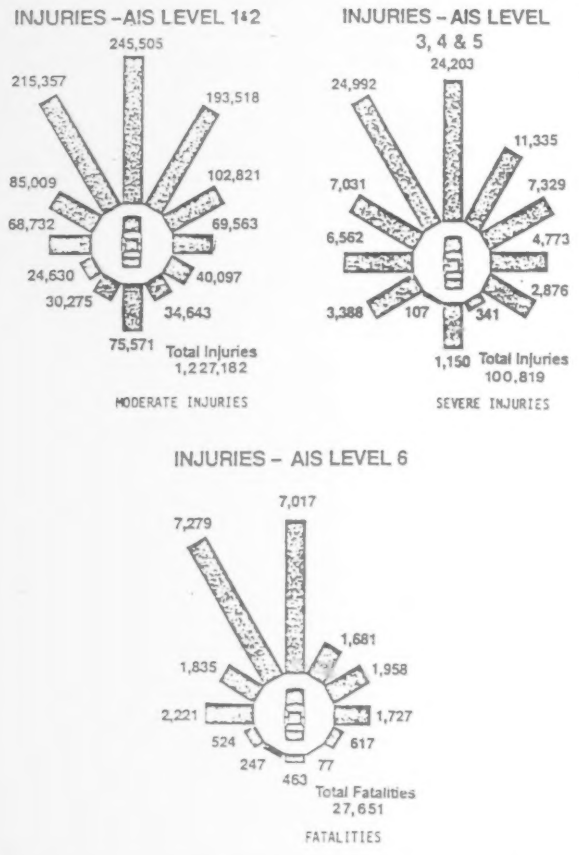


Figure 5, also from that testimony, illustrates that the driver and how he drives affects the fatality rate significantly. Crash Tests of hot cars like Camaro or Nissan Z's, Corvettes and Firebirds, favorites of the younger and more aggressive driving public, indicate that they perform like other cars in the same weight class. Therefore, they must crash at speeds in excess of the protection provided and warrant installation of the most advanced high performance restraints possible.

FIGURE 5. PASSENGER CAR OCCUPANT FATALITIES PER 100 MILLION VEHICLE MILES BY CURB WEIGHT

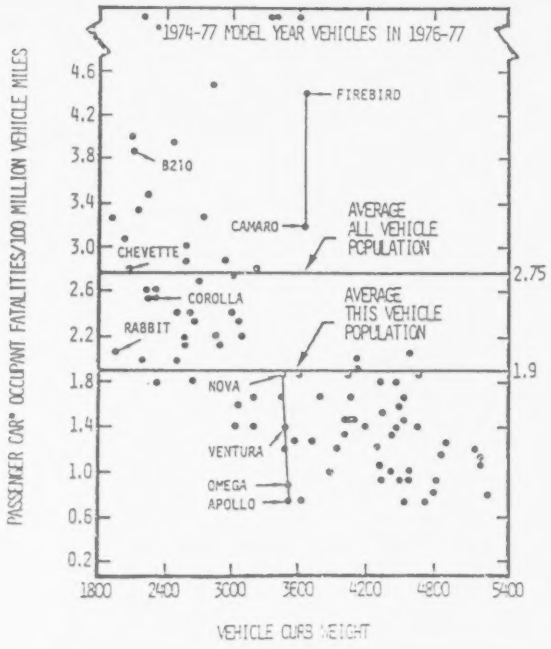


Figure 5 also shows that there were many component features of different versions of the same car (like the Camaro and Firebird, and the GM Nova, Ventura, Omega and Apollo) which effected and determined its fatality rating. That is particularly true of different engine orientation and sizes.

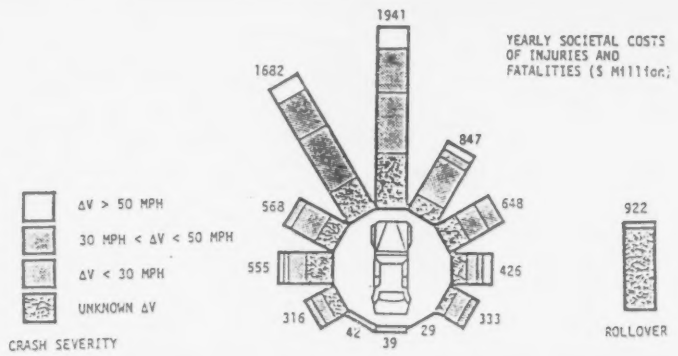
Real world accidents are not reasonably represented by FMVSS 208 dynamic tests. The field distribution of frontal accidents that could be simulated by a dynamic test are shown in Figure 6. Of these FMVSS 208 frontal and 30-degree angled barrier tests represent about 37% (indicated by *). Real world accident studies indicate that severe injuries occur at the same delta-v particularly as a result of compartment intrusion and represent an additional 43% of the population (indicated by +). While additional tests would be the best assurance of performance in these modes, then adjusting the angled varrier test to 45 degrees from 30 degrees is the least change which will add this 43% additional representation to the standard.

Figure 6.—Estimated Field Relevance for Various Tests

Test condition	Percent field accidents	Test condition	Percent field accidents
Frontal barrier*	2	Partial car-to-car+	14
Partial barrier+	2	Frontal car-to-car*	11
Bumper underride B	4	Angle car-to-car+	13
Partial underride B	7	Angle barrier*	24
On-center pole	5	Ang Hng Plr car-to-car+	5
Off-center pole+	9	Undercarriage hang-up	3
Off-center low pole	1		

Figure 7 is Societal Loss Distribution by damage area mode and delta-v from the Minicars RSV Final Report,[5] using the National Crash Severity Study (NCSS).[12]

FIGURE 7. SOCIETAL LOSS DISTRIBUTION



NHTSA in 82 (based on 1979-1980 National Accident Sampling System [NASS][13]) published a study[14] which illustrates the relationship between various levels of injury and the magnitude of possible error with different statistically manipulated data sources. It also analyzed the National Crash Severity Study (NCSS) file to identify the difference in crash severity between full size and subcompact cars in the 1975 time frame, when most cars were large. It confirmed that with those 1975 cars, the mostly unrestrained occupants of small cars were exposed to a higher distribution of crash severity (about 10 mph higher at 30 mph) as compared to large ones.

The important point here is that with minimum restraint usage, severe injuries and fatalities were not handled as well by small as large cars and light trucks, and therefore represented a large portion of the projected severe casualties. Figure 1 was a projection to 1985 of the societal cost (harm) resulting from small cars at the same level of restraint usage as 1975.

Fortunately, the advent of Mandatory Use Laws and the implementation of FMVSS 208 beginning in 1987 has had and will continue to have an increasingly significant effect in the reduction of all casualties and in small cars. At present even with 47% restraint usage, small cars represent about a third of the total fleet (including light trucks), but more than half of the societal cost (harm) of injuries and fatalities.

The various files roughly summarize the history of casualties to the present as shown in Figure 8.

Figure 8.—History of Fatalities and Estimated Number of AIS Injuries

Year	Fatalities	Fatalities/ 100 M VMT	Serious injuries	Fatalities and injuries in cars by AIS			
				6	5	4	3
1975	44,525	3.4	[1]206,868	28k	15k	15k	87k
1980	51,091	3.3	441,674	32	41	42	241
1985	43,825	2.5	378,880	27	35	36	207
1990	44,500	2.1	394,000	28	36	36	210

[1] MDAI, all other from FARS and NASS.

These data confirm that as the percentage of small cars in the population increased to 1980 so also did the serious injuries, particularly in small cars. As the spread in weight decreased, restraint usage climbed and the population stabilized (with small cars around 50%) between 1980 and 1985, serious injuries also declined. The elimination of the mini-subcompact, decreased weight of the large car and moderate improvements in safety of newly redesigned 1980's models contributed to this decline.

By then the distribution of serious injuries was strongly skewed towards small cars. By 1990 growing restraint usage (now at about 50%) is leveling the number of serious injuries as the total mileage increases so the overall fatality rate is decreasing but the disparity in small cars remains because we failed to incorporate advanced safety into them.

In the future, even with over 70% restraint usage there will be a continuing safety disparity, between small and large cars and light trucks, unless the Federal Vehicle Safety Regulations are adjusted to reduce small car casualties while requiring equal barrier performance from all cars and light trucks. One way this could be accomplished by changing the angled barrier test to 45 degrees (from 30 degrees) representing a large percentage of the most frequent and particularly intrusive (in small cars) impact modes.

CHARACTERIZATION OF COLLISION AVOIDANCE TECHNIQUES

The most prominent and popular devices in this category are and will be Electronic enhanced controls, the currently most popular of which is the Antilock Braking System (ABS). Several of these systems were incorporated into the Minicars Advanced Research Safety Vehicle [15] including ABS, a radar activated Cruise Control Following system, an Emergency Braking System and an Electronically Shifted Transmission. Earlier studies at General Motors Research Laboratories, had demonstrated the feasibility of such Driver Aids including passive optical lane guidance and alcohol interlocks to prevent drunks from driving.

These techniques have perceived value to the consumer and need not be incorporated by regulations because they are active all the time and impact driver performance. Their sales will enhance safety and will not unduly encourage more aggressive driving as is sometimes feared.

CHARACTERIZATION OF THE STRUCTURAL DESIGN ALTERNATIVES

Structural design considerations—To characterize the difference in fatality rate between small (2200 lbs.) and large (3300 lbs.) current cars, consider that regulations require equal non-life threatening restrained occupant protection at 30 mph.

But when with unrestrained occupants these cars run into each other, each going 25 mph for example, the large car occupants experience a mass determined 20 mph non-life threatening collision, while the small car occupants are in a 30 mph life threatening collision. when these same cars with restrained occupants run into each other each going 35 mph (the NCAP test speed), the large car occupants are in a mass determined 28 mph near-life threatening collision, while the small car occupants are in a 42 mph fatal collision.

There are then two problems with frontal Crashworthiness performance and Standards: To provide equal protection at the accident severity level of current large cars, Small cars must meet the FMVSS 208 injury criteria at higher speeds. And second, the capability of all cars to protect in the frequently occurring, strongly angled or offset impact mode must be enhanced. These were part of the NHTSA Advance Notice of Proposed Rule Making (ANPRM) on FMVSS 208 in 1977 but it was never implemented.

It is important to point out here, the significance of implementing the dynamic test requirements of FMVSS 208 in 1987. Advocates and the public understood the auto companies to be resisting the installation of airbag restraints (which was certainly true). But more than that, they were resisting a shift from ha-are engineering tests to biodynamic (human movement) tests with Biomechanical Injury Criteria results. For the first time in 1987, it didn't matter how the structure performed in an accident, it only mattered how the occupants came out of it.

That was the foundation of the 1974 Minicars RSV program and the engineering consequences still have not been embraced by Industry's management. whereas in the past automobiles were designed principally by mechanical and structural engineers who made the parts fit together and last and deform within specifications, from 1987 on (with FMVSS 208 implementation) the structure is primarily the transportation element and secondarily the human accommodation.

The key to future reductions in injuries and fatalities lies in occupant protection thru decisions of the Systems Design Engineer, the Biomedical Engineer, the Biodynamicist, the Restraint Engineer, and the Computer Simulation Scientist. Indirectly, these same people are the key to increased fuel economy.

The reason is that adjusting the accommodation structure to improve the crashworthiness (the deceleration and resistance to intrusion) of a two to four thousand pound car adds much more weight than an advanced restraint system (the surfaces which contact the occupant) which only needs to bring a one to two hundred pound occupant to rest without a second collision which is too hard or too fast.

This fundamental consideration means that once you commit to an airbag restraint system (with a passive interior), its performance can be adjusted without weight penalty to protect to the limit of excessive structural intrusion which even in many current small vehicles is 40 mph (1.75 times as much energy as 30 mph) in frontal barrier and 30 mph in strongly angled or offset impacts.

Having finally penetrated this resistance to designing vehicles for people, the Regulatory efforts to improve protection in all cars in side, rollover and rear impact modes must continue and be finally implemented.

There are many structural alternatives to increase safety performance but in view of the ease (low weight and cost) with which it can be done thru restraints and passive interiors it seems likely that structures will be optimized, that is, weakened and lightened to just meet safety standards and provide more exhilarating acceleration, unless safety and CAFE standards are increased.

Only two significant structural modifications are likely to gain favor: (a) transfer and distribute offset loads across the whole structure and (b) strengthen the passenger compartment just enough to limit excessive interior intrusion to meet FMVSS test requirements with restraints and passive interiors.

If test standards are increased:

Since an air cushion restraint system can accommodate higher amplitude deceleration, increased front end stiffness will be accomplished by substituting higher strength steel and/or more energy absorbing, omnidirectional sheet metal crushable elements instead of buckling beams so as to minimize any weight increase.

Increased distance between the steering wheel or dash and the front seat occupants chest and head will provide for more occupant stroking (at lower acceleration levels) before contacting an interior surface. Longer seat tracks for more nominal front seat room in conjunction with air bags wouldn't add weight.

Rotating or altering the location of the engine is practical with no weight penalty. Front wheel drive allows for longitudinal or transverse engines and a transverse engine allows for the block to be located in front of the driver or passenger. Since left frontal offset and angled impacts are more frequent and severe, the engine orientation which minimizes intrusion of the steering wheel and "A post" into the driver would be most protective.

Transferring and distributing offset loads across the whole structure is being facilitated by finite element computer programs. Modified designs with minimum weight increase can greatly enhance offset and strongly angled impact performance, or the same programs can be used to decrease weight in the currently regulated frontal impact mode.[34]

Strengthening the passenger compartment to reduce interior intrusion can often be accomplished by better attachment and welding techniques of the existing structural elements. If there were a regulatory requirement to test in the offset and strongly angled impact mode or the 45 degree angled barrier rough equivalent, transfer of front end structural loads for absorption through the door, its structural surround and the rear of the compartment would be considered.

CHARACTERIZING RESTRAINT ALTERNATIVES

During the interval from 1970 to 1987 the requirements of FMVSS 208 regarding front seat restraint installation was met by three point harnesses. Less than 15% of the occupants used them until passage of mandatory seat belt usage laws in 1985-87. There was no regulated dynamic test performance criteria, so that while some manufacturers adjusted anchor points for good performance over a range of occupant sizes and others improved the design and performance of the emergency locking retractors, there was little accident data collected on the effectiveness of restraints and less on the effectiveness of restraints in accidents of high severity (greater than 30 mph change in velocity).

Most of the regulatory effort was to affect the implementation of automatic restraints (automatic belts and air bags), to encourage public "Buckling-up" and the States to enact "Mandatory Usage Laws" and to make it less awkward to wear belts by the incorporation of so called "comfort features" which allowed the torso belt to accumulate slack for freedom of movement at the cost of extended occupant forward motion.

During that same interval much dummy and restraint research was accomplished and many high performance concepts were developed and demonstrated in all seating positions and all size cars and trucks. These are detailed in NHTSA Minicars Contract Reports.[16–25] There were many additional efforts, by other contractors namely Cal span, by GM with their 30 mph GM ACRS system (produced during 1974 to 1976), as well as several 30 mph fleet installations by Ford and Volvo, and a variety of 30 mph two (VW) and three point (GM) automatic belt systems.

Minicars, beginning in 1972, developed for NHTSA and any manufacturer who wanted to use it, advanced airbag and belt harness systems to protect driver and passengers in impacts of up to fifty miles per hour in small and large cars.[26–29] Of course there were structural modifications required of then current vehicles to pro-

tect at above 40 mph in most cars, since intrusion became excessive due to poor design techniques.

The key to the high performance was associated with: rapid rise times of multiple limited-volume airbags, deep force limiting knee bolsters, pretensioning thru two point airbelts, the orientation and energy absorption stroking of the steering column, force limited anchor points, laminated and partially fixed side glazing and padding at potential interior contact points. These advanced systems did not require the combination of three point harness and airbag (the now popular Supplemental Restraint System).

Although FMVSS 208 airbags and automatic belts were finally implemented in 1987 after 17 years of delay, there is little hope that even by 1994, we will realize the dream of gross small car casualty reduction. This is because as mentioned earlier, the standard does not recognize the inherent deficiency of a barrier test replicating a real world car to car accident in an offset and/or strongly angled impact mode and because the auto companies will do little more than the standard requires.

As early as 1977 Minicars at NHTSA's request, polled the industry[30]30 to which of a variety of alternative current restraints of differing performance levels they would implement in which cars. The auto industry candidly stated that if required by FMVSS 208, it would implement a minimal safety compliance by primarily installing automatic belts, and could not even foresee implementing airbags in small cars.

The alternative systems included modifications to the 1974-1976 GM ACRS, with techniques developed for Subcompact Cars and with potential for increased protection at higher velocities. The GM ACRS had been developed and was updated for large cars, a productionized steering column modification and knee restraint was suggested for smaller car installation and a new shallow angle stroking column modification[29] was suggested for installation in the smallest cars. Harnesses included torso belts attached to the door with knee bars below the instrument panel, webbing-lock retractors, force limiters, belt pretensioners and column retractors.

The technological capability to increase the protection of occupants in conventional small cars in 40-plus mph barrier equivalent impacts was demonstrated in 1979,[24] by a Minicars driver airbag upgrade of an early model Volvo production car with a Minicars passenger Air belt and independent crash testing at Dynamic Science in a variety of accident modes including offsets. The modifications demonstrated involved no significant increase in small car cost or weight.

Maintaining the current inequity in safety performance protection of small cars is unconscionable yet is the result of regulatory compromise and inaction as well as manufacturers interpretation of minimum performance. Those interpretations are limiting the implementation of air bag restraints in small cars where they are most needed, and favoring automatic belts which are cheaper.

CHARACTERIZING PASSIVE INTERIORS

In conjunction with its development of high performance air bags for small cars in the early 1970's, Minicars, Inc. attempted to provide truly passive protection in all accident modes. The passive interior concept was epitomized in the Minicars Research Safety Vehicle (RSV), applied to the Chevrolet Citation in the Modified Production Vehicle program (MIV) and incorporated and publicized to some extent in General Motors X and J cars in the late 1970's and early 1980's.

The extent to which the initial implementation could be expanded and its effectiveness in reducing AIS 4 to 6 injuries increased, has been the subject of a six year research effort using real world injury accident case data, NHTSA and other published research results, manufacturer's crash test data and computer simulations and analysis.

The analytical protocol used was previously described and included case work examples.[31] A paper to be given at the 13th International ESV Conference in November[32] describes the effectiveness of passive interior modifications in mitigating head and neck injuries in frontal, side and rollover accidents. The performance in each accident mode with and without alternative restraints, are compared to the injuries in the manufacturer's as-built test results. Consideration is also given to the injuries which would have resulted if improved passive interior components had been installed.[33] Recently available manufacturer's research information on offset frontal and rollover impacts has provided the data to complete the computer analysis.

In summary, the results indicate that a force limited plastic covered metal contact surface, separated from the main structure above the belt line by an inch or two, would have a dramatic effect on head and neck injuries regardless of restraint usage and performance. General Motors, which recognized this effect in 1980 and committed to it in 1984 has in 1991 expanded the depth of molding in some models at the

roof rail and A-post to begin this process. while a passive interior, like a helmet, protects in many frequently occurring circumstances, in high speed frontal accident modes, it is a supplement to, but no substitute for, effective restraints.

In offset frontal impacts, the structural intrusion of the A post, instrument panel and the steering wheel hub have combined with restraint ineffectiveness and high angular principal directions of impact force (PDIF) to result in brain damaging head contacts. They are entirely foreseeable, confirmed by manufacturer's tests and mitigatable by increasing the depth of force limited, high efficiency padding on the A post, windshield header and roof rail.

while not a substitute for structural load transference and alternate steering column coupling to the front end to limit the intrusion, it would at least deal with the restrained occupants severe injury contacts to the column and A post in 30 and 35 mph vehicle delta V impacts.

In side impacts, it appears that these techniques will be implemented more extensively and extended to meet the requirements of the revised FMVSS 214 dynamic tests. However, particular attention should be paid to head contacts on the roof, roof rails and on the far side as a result of unrestrained occupant motion towards the intruding door/side structure.

In rollover impacts a number of injury mechanisms have been identified and categorized. Head and neck axial compression alone and in combination with sheer and flexion forces, lead to cervical fractures and spinal cord injury at relatively low force levels compared to that resulting in brain damage. Furthermore these force levels result from head to roof contact velocities with a seated body orientation in the range of 2 to 3 meters/sec. which are typical during roll initiation with torso augmentation, or during roof and roof rail contact through a combination of vertical and centrifugal torso and roof intrusion velocity.

In summary the countermeasures for rollover protection include:

(1) moderately increasing roof support strength to eliminate roof collapse and reduce intrusion velocity, by increased post sections and gauge, fixed side glazing and reduced side glazing area;

(2) facilitate the natural protection of the neck musculature by inclining and reducing the pocketing effect of the roof surface;

(3) increasing head room and restraint effectiveness against vertical occupant motion;

(4) incorporating a force limiting, non-pocketing head liner separated from the roof by an inch or two; and finally

(5) laminated side glazing to reduce the possibility of partial ejection and head to ground contact.

CHARACTERIZING VEHICLE DESIGN TO ACHIEVE FLEET PERFORMANCE

Based on the characterizations (from twenty years of observed behavior) of the consumer and manufacturer in a regulatory environment, injury accident data bases, industry and Government research and development test data and available design alternatives, we can apply the Minicars R5V design/performance methodology to understand the consequences of Regulatory options.

For this study and based on regulatory implementation history, we chose modest and reasonably achievable goals for phased implementation in 1996 and for 2001.

Safety for 1996: Modify FMVSS 208 to substitute a 35 mph frontal and 45 degree angled barrier test for small cars, retain the 30 mph frontal and 45 degree angled barrier test for large cars and implement the Paragraph S8.3 rollover test with an added (4000 newton) neck compression injury criteria for all cars.

Fuel Economy for 1996: Achieve a 34 mpg CAFE simultaneous with Safety improvements.

Safety for 2001: Raise the above FMVSS 208 frontal and angled safety protection performance to 40 mph and conduct all FMVSS 214 Side Impact tests at the same speed.

Fuel Economy for 2001: Achieve a 40 mpg CAFE with known technology and simultaneous with Safety improvements.

Since manufacturers have chosen to embrace Regulation as the performance target rather than as a performance minimum, the study purpose is best served by predicting what design alternatives manufacturers would implement and how difficult it would be for them to achieve this performance. Alternate options can also be analyzed.

STRUCTURAL DESIGN CHOICES FOR 1996

The analysis is based on selecting a typical car in each size category and estimating the effect on weight of modest design and engine changes which could be accom-

plished in the near term. Unspecified Safety modifications weighing one hundred pounds were also included in the estimate. The estimates are backed up by at least one current production car in the category. In other words, the effect on the average of cars in a class is considered by improving all cars performance to that represented by a "near-best-in-class" since consumers require variations. The weight reductions and basis for changes are shown below in Table 3.

Table 3.—Structural Design Choices for 1966

Typical size	Mfg. model	EPA/Orig. weight	Redesign weight	Design change	Change basis
Large	GM Caprice	4000	3500	TRNSV FWD	LRSV
Midsize	GM Cutlass	3500	3000	TRNSV FWD	LRSV
Compact	Ford Escort	2500	2500	HSLA STL	C/C RSV
Subcompact	Honda Civic	2500	2500	HSLA STL	CRX

SAFETY IMPROVEMENT DESIGN CHOICES BY CLASS FOR 1996

The choices were made to achieve the required performance with the least lead-time, structural modifications, weight penalty and change in current or planned product technology. The choices and performance are shown below.

Size	Restraints		Accident mode performance (mph)			
	Driver	Passenger	Frontal	45-degree	Side	Roll
Large	Airbag	Airbag	30	30	33	30
Midsize	Airbag	Airbag	30	30	33	30
Compact	Adv. AB	Adv. AB	35	35	33	30
Subcompact	Adv. AB	Adv. AB	35	35	28	30

For the large car, this means slightly improved roof strength, upper structure passive interior, laminated side glazing, the already included SRS airbags, ASS and Contoured side impact padding.

For the midsize car, this means slightly improved roof strength', upper structure passive interior, laminated side glazing, the already included SRS airbags, ABS and Contoured side impact padding.

For the compact car, this means improved roof strength, HSLA fender wells and catwalks, upper structure passive interior, laminated side glazing, uploading and compartmenting the driver side SRS airbags[26] on a stroking RSV steering column,[29] installing an advanced airbag on the passenger side, ABS and contoured side impact padding.

For the subcompact car, this means improved roof and A pillar strength, HSLA fender vells and catwalks, improved door beam hinge and latch attachs, upper structure passive interior, laminated side glazing, uploading and compartmenting the driver side SRS airbags on a stroking RSV steering column, installing an advanced airbag system on the passenger side, ABS and contoured side impact padding.

ENGINE/TRANSMISSION/DRIVE TRAIN DESIGN CHOICES FOR 1996

For each size car, the choice is for Four cylinder, sequential fuel injected, multi-ported, transverse, front wheel drive with electronically shifted five speed transmission. Application of a near-best-in-class choice results in the following CAFE.

Typical size compartment	EPA/Original average mpg	Redesign mpg	Percent share	Eng./trans. basis
Large	23.8	28.0	13.3	SAAB 9000S
Midsize	28.2	32.2	27.6	Chev. Corsica
Compact	28.9	40.7	31.3	Pontiac LeMans
Subcompact	31.6	40.9	27.8	Honda Civic
Average all cars	27.8	38.0	100	38.0/27.8=1

The tables above show that it is within current technology to achieve the desired safety and fuel economy performance goals. Since in every case a tested design or production example is available from which to initiate component redesign, the 1996 target is possible.

The Safety situation is much the same for 2001. Most of the higher performance protection will be achieved with upgraded restraint and passive interior components rather than thru a change in technology. Weight reductions will be possible through material substitutions and lighter engine/transmissions.

Size compartment	Volume	EPA/1966 weight	Redesign weight	Design changes	Basis
Large	125 cu. ft.	3500#	3250#	MAT'L SUBST	LRSV
Midsize	115 cu. ft.	3000#	2875#	MAT'L SUBST	LRSV
Compact	105 cu. ft.	2500#	2500#	HSLA STL	C/C RSV
Subcompact	90 cu. ft.	2500#	2375#	HSLA STL	CRX

In addition to the improvements due to weight reduction shown above, the CAFE improvements will come from engine efficiency efforts, and a kind of standardization between car models in the same class on engine/transmission designs, controls and performance exhibited by the best- in-weight-class plus a modest adoption of new technologies as dicussed below. Consumers of the compact and Subcompact vehicles will give up top-end performance as they will with alternate fuel, electric and hybrid-electric power plants. The results show a 40 mpg CAFE is possible.

Typical size compartment	EPA/Orig. average mpg	Redesign mpg	Percent share	Eng./trans. basis
Large	23.8	31.3	13.3	CmryW/Saab9000
Midsize	28.2	35.3	27.6	EscW/Corsica
Compact	28.9	43.7	31.3	Ford Escort M4
Subcompact	31.6	48.8	27.8	Civic M5/HF
Average all cars	27.8	40.1	100	40.1/27.8=144%

FEASIBILITY OF 34 MPG BY 1996 AS DEMONSTRATED BY PRESENT VEHICLES

Analysis of 1990 CAFE data confirms that obtaining a 34 MPH CAFE for 1996 is feasible with present technology and vehicles. The 1990 fleet mix by weight is shown in the table below. Each weight class has a technology leader which is the best in the class as shown. If every vehicle in the class was as fuel efficient as the best vehicle in the class, the 1990 CAFE would have been 34.4 MPG versus the 27.8 MPG actually obtained. Since this is a fixed mix and weight scenario by definition, no downsizing or weight reduction has to be done to obtain this CAFE. Present vehicles in every size and weight class already exist to demonstrate the feasibility of meeting 34 MPG by 1996. Even if the next four lower vehicles in each class were used instead of just the top vehicle, the 1990 CAFE would still be 32.5 or 4.7 MPG better than actual 1990 CAFE.[40-41]

1990 Best in Weight Class 34.4 MPG Analysis

Class	1750	2000	2250	2500	2750	3000	3500	4000	4500	5500
Share	0.01	1.3	1.4	12.6	10.4	31.0	31.3	11.0	1.07	0.01
MPG	65.4	56.0	59.2	42.2	46.9	33.2	33.7	25.6	22.9	13.2

FEASIBILITY OF 40 MPG BY 2001

Analysis of 1990 CAFE data also confirms that obtaining a 40 MPG by 2001 is feasible without a mix shift or downsizing by materials substitution to reduce weight and modest introduction of new technology. With a reduction of only 200 pounds from the present 3,171 average weight to 2,974 pounds and no shift to a smaller car mix, the 1990 best in class fleet would attain 37.5 CAFE as shown in the following table. Retention of the present size mix is possible since there are multiple weight classes for each size class.

1990 Best in Class 37.5 MPG Analysis

Class	1750	2000	2250	2500	2750	3000	3500	4000	4500	5500
Share	0.7	1.3	7.5	11.4	21.7	31.2	20.2	5.6	0.49	0.01
MPG	65.4	56.0	59.2	42.2	46.9	33.2	33.7	25.6	22.9	13.2

Any number of new technological options can be used in conjunction with materials substitution or alone to accomplish the modest CAFE improvements necessary to bring the 1990 best in class levels to 40 MPG in the ten years until 2001. The following is a list of such technologies and their potential. Only a few need to utilized in part to go over 40 MPG.

The present analysis conservatively assumes auto companies will realize only 3.5% in improvements in CAFE from new technologies out of a potential CAFE improvement of 15-20% within the next ten years. New technological improvements such as further reductions in aerodynamic drag, intake valve control and improved transmissions will occur, the only issue being the extent of their market penetration. Beyond these realized new technologies, the auto companies will realize fuel economy credits from the production of alternative fuel vehicles which lower any CAFE standard they have to achieve. General Motors has already certified a Flexible Fuel 3.1 liter V-6, 3750 lbs. Lumina for 1991 at a CAFE adjusted gas mileage of 35.7 mpg versus 23.6 mpg for the gasoline Lumina. With maximum utilization of new technologies, including phase-in of direct injection stratified 2-stroke engines in compact cars, the auto companies could attain CAFE levels of 45.8 mpg by 2001.

2001 technologies	Vehicle mpg improvement (percent)	Fleet CAFE improvement (percent)
Advanced aerodynamics C_D=0.2–.3O	5	3
Intake valve control	6	2
5-spd. auto. transmission	2.5	2
Engine improvements—Low mass advanced piston; ceramic valves; 5-valve engine; modulated Displacement; and increased/variable compression	5	2
Alternative Engines—Direct injection stratified 2-stroke; direct injection diesel; and hybrid stored energy	20	5
Advanced materials—Graphite reinforced plastics	6	3
Improved tires C_R=0.0075	0.5	0.5
Alternative fuels	3	3

Vehicles today which already utilize technologies such as multi-valve engines and efficient packaging can easily be improved with existing technology such as 5-speed automatic transmissions and intake valve control. The following example shows how application of proven technology will enable a Toyota Camry to go from 32.8 to 41.3 mpg.

Toyota Camry	Actual 1988 specification	Potential 2001 specification
Curb weight	2811	2575
Drag co-efficient	0.36	0.30
Interior volume (cu. ft.)	89/12	89/12
Frontal area (sq. ft.)	20.45	20.45
Engine type	4-cyl/4 valve DOHC	Same w/intake valve control
Displacement (CID)	122	110
Transmission	L-4/(M-5)	L-5/(M-6)
0–60 mph time (sec)	9.2	11.5
Fuel economy (mpg)	32.8	41.3

The additional technologies used by 2001 which are not presently in the Camry and their fuel economy benefit are as follows: 10% weight reduction, 6.6%; drag reduction II, 2.3%; intake valve control, w/5-spd. auto. transmission, 6.5%; advanced friction reduction, 2.0%; advanced tires, 0.5%; improved accesories, 0.2%; engine/av. acceleration, 7.5%; and 2001 totals, 25.9%.

POTENTIAL SAVINGS IN FATALITIES AND INJURIES.

When DOT published its final report in 1980 determining that mass-production of the Research Safety Vehicle was feasible, DOT concluded: "If all cars on the high-

ways contained the safety of the RSV, annual deaths would be reduced by more than 12,000."[43] Based on the analysis in this study, our best estimates are that with current regulations and their scheduled implementations, in spite of increased population and vehicle miles travelled, by 2001 auto occupant fatalities and injuries will have been stabilized at ten percent lower than current levels, but with continuing safety disparities between small and large cars and light trucks because NHTSA failed to require the advanced safety counter-measures proposed in the 1970's. The FMVSS 208 modifications proposed in this study would correct the disparities adding an additional ten percent benefit, while achieving 40 mpg CAFE levels by 2001.

Projected Annual Fatalities and Injuries From FMVSS 208 and Adding FMVSS 214

Year	Fatalities	Fatalities/ 100 M VMT	Serious injuries	Fatalites and injuries in cars by AIS			
				6	5	4	3
1990	44,500	2.1	394,000	28	36	36	294
1995	42,500	2.0	360,000	26	30	30	274
2000	40,000	1.8	340,000	24	27	28	261

Estimated Annual Fatalities and Injuries From FMVSS 208

Year	Fatalities	Fatalities/ 100 M VMT	Serious injuries	Fatalites and injuries in cars by AIS			
				6	5	4	3
2000	36,000	1.6	300,000	22	20	26	232

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Senator BRYAN. Ms. Sadoff, we will hear from you this morning.

STATEMENT OF MICKY SADOFF, PRESIDENT, MOTHERS AGAINST DRUNK DRIVING, IRVING, TX

Ms. SADOFF Good morning Mr. Chairman. It is a pleasure to come before you again and discuss the subject of drunk driving and the Federal Government's role in helping rid our highways of drunk drivers.

To come before this committee is to come before old friends. Over the course of MADD's 10 years as a grassroots advocacy organization combating drunk driving, this committee has been the venue for many of our most significant advances. This committee developed the NHTSA 408 alcohol intensive grant program in 1982 and in 1984 held in-depth hearings into the issues involved in raising the minimum drinking age to 21. From this committee in 1988 came the alcohol beverage container warning label legislation as well as the Drunk Driving Prevention Act, now known as NHTSA 410.

My purpose in being here today is to urge the committee and this Congress to revise and extend the provisions of the NHTSA 408 and 410 anti-drunk-driving incentive grant programs consolidating these programs into a single program devoted exclusively to combating drunk driving.

Let me also make it clear that while MADD wishes to maintain an antidrunk driving program which is authorized and appropriated as a discreet program, we will also support separate programs designed to advance an agenda of highway safety initiatives including speed enforcement, safety belt and motorcycle helmet use.

In early drafts of its modification to these programs the Bush administration suggested the consolidation of 408 and 410 programs into one program. MADD thinks it was a suggestion well taken. We have learned a substantial amount since 1982 about what works and what does not in combating drunk driving, and MADD believes that it is time to consolidate and streamline the two incentive

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In early drafts of its modification to these programs the Bush administration suggested the consolidation of 408 and 410 programs into one program. MADD thinks it was a suggestion well taken. We have learned a substantial amount since 1982 about what works and what does not in combating drunk driving, and MADD believes that it is time to consolidate and streamline the two incentive grant programs in existing law in the interest of targeting our efforts on these countermeasures which have demonstrated the greatest ability to save lives.

MADD believes that not all countermeasures are equal. While many might be useful, some are of a more immediate importance than others, and that is why we suggest the continuation of a feature found in sections 408 and 410, the separation of countermeasures into two tiers, a set of criteria which would qualify a state for a basic grant and a set of supplemental criteria, which, once basic eligibility is achieved, would provide additional support for the adoption of additional countermeasures.

Mr. Chairman, MADD would urge you to adopt the program that includes the following basic criteria: administrative license revocation, a .08 BAC per se definition of intoxication, sobriety checkpoints, mandatory 48 hours incarceration for repeat offenders and self-sufficient STOP DWI programs. In the course of the last year MADD activists across the country have been working to urge adoption of administrative license revocation designed to deliver swift and certain punishment to drunk drivers and safer roads for all of us. In 1988 the Insurance Institute for Highway Safety found a 9-percent increase in nighttime fatal crashes in those States that adopted administrative revocation and NHTSA in a separate study confirmed that decrease.

Administration revocation is legally sound, it works and it saves lives. MADD has been working with a coalition of insurance and auto safety groups convened by the National Transportation Safety Board and NHTSA dedicated to making advances on administration revocation across the country and we are encouraged by the results to date. The major new item that we hope you will put on your agenda is the adoption of .08 BAC as the per se definition of intoxication.

California, so often a bellwether State, has adopted .08. Three other States have also moved to .08 and we believe on the basis of what we see around the country that .08 is the next major advance to be made in combating drunk driving across this country. Congress has set the intoxication level for pilots and commercial truck drivers at .04 and there is ample scientific evidence that shows that impairment occurs at .02 BAC and virtually all drivers are impaired at .08. It is clearly time to move to .08 nationwide.

MADD strongly favors the inclusion of .08 among basic criteria employed in any new incentive program. However, to avoid making States ineligible for grants while they revamp their BAC level we will suggest that the States be given 2 years to adopt .08 during

which time they would be qualified for a basic grant provided they meet the basic criteria.

In the aftermath of the Supreme Court's finding in 1990 that sobriety check points were a constitutional means of deterring and apprehending drunk drivers, MADD favors a major push to have this very effective countermeasure employed by the States. MADD also continues to support the development of self-sufficient programs at the State level which provide ongoing support for stop DWI efforts. MADD has been listening to many highway safety representatives who argue that Federal programs are often too rigid and do not give enough credit for performance as opposed to the achievement of certain criteria devised in Washington. We think that the States make a good point in this regard and are prepared to see performance rewarded. We would therefore suggest that any State that has a 5-percent reduction in alcohol-related fatalities over the 5-year period prior to their application for an intensive grant be given credit for that performance and have one of the basic criteria waived. A State so characterized would therefore have to meet only four basic criteria not five.

Once a State is eligible for a basic grant, MADD believes that the State should continue to show progress in order to remain eligible. MADD therefore suggests additional supplemental criteria; namely, mandatory BAC testing in the case of crashes which result in death or serious injury; prohibitions on open containers and the confiscation of license plates of those who drive under a revoked or suspended license. MADD suggests that for each supplemental criterion adopted the State receive an additional 5 percent of its 402 allocation. We suggest that a State could be eligible for a 5-year period if it achieved basic eligibility and adopted at least two supplemental criteria during the period of eligibility. Basic eligibility alone should be for a maximum of 3 years. The intent here is to provide an incentive for States to maintain momentum.

In summary, I would like to touch on the administration's proposal. We have enjoined excellent working relationship with the Department of Transportation. Secretary Skinner has been steadfastly accessible and supportive of MADD's cause. I should add President Bush has been equally supportive and has used the authority of the Presidency to save lives on our highway.

We are, however, disappointed with the product offered by the Department of Transportation as regards modification to the existing Federal law designed to combat drunk driving. As noted earlier, we see no justification for lumping drunk driving in with a host of other safety initiatives.

I see the red light is on. Do you mind if I continue?

Senator BRYAN. You go right ahead, Ms. Sadoff.

Ms. SADOFF Thank you very much. The concentration on drunk driving under existing law in a separate and focused program is warranted by the facts facing us on our Nation's highways. Indeed a Gallup poll currently underway for MADD shows that the public considers drinking and driving a far greater safety program than poor highways or construction. This is no time to let down our guard on drunk driving.

Second, we see no justification for holding alcohol safety grants constant at $25 million per year while construction related grants

grow steadily over 5 years. There are ample funds available for safety under the Federal Highway Administration program today. Why the Federal Highway Administration program needs to encroach on the resources of the much smaller NHTSA program has not been adequately justified.

I wanted to restate that it has been a pleasure to appear before you and I would be happy to answer your questions.

[The prepared statement of Ms. Sadoff follows:]

PREPARED STATEMENT OF MICKY SADOFF

Mr. Chairman, members of the Subcommittee, it is a pleasure to once again be before this Committee to discuss the subject of drunk driving and the federal government's role in helping to rid our highways of drunk drivers.

To come before this committee is to come before old friends. Over the course of MADD's ten years as grass roots advocacy organization combating drunk driving, the Senate Commerce, Science and Transportation Committee has been "the venue for many of our most significant advances. This Committee developed the NHTSA 408 Alcohol Incentive Grant program in 1982 and in 1984 held in-depth hearings into the issues involved in raising the minimum drinking age nationwide to 21. From this committee in 1988 came the alcohol beverage container warning label legislation as well as the Drunk Driving Prevention Act, now known as the NHTSA 410 program.

MADD, as an organization, and I, as its President, have been proud of our association with these legislative victories for the victims of drunk driving and we look forward to making further progress this year as Congress extends and modifies the highway safety provisions of the Surface Transportation Assistance Act.

My purpose in being here today is to urge the Committee and this Congress to revise and extend the provisions of the NHTSA 408 and 410 anti-drunk driving incentive grant programs, consolidating these programs into a single program devoted exclusively to combating drunk driving.

me also make clear that while MADD wishes to maintain an antidrunk driving program which is authorized and appropriated as a discreet program, we will also support separate programs designed to advance an agenda of highway safety initiatives including speed enforcement, safety belt and motorcycle helmet use.

There will be those who would say that drunk driving is but one of many problems on our nation's highways and that now is the time for the adoption of a generic highway safety bill. While MADD recognizes that safety belt laws, motorcycle helmet statutes and other measures are important, we would emphatically maintain that more than 22,000 Americans lost their lives last year in alcohol- related highway crashes. This is no time to diminish the concentration on drunk driving as a national problem of tragic proportions.

Today, in existing law, we have two programs developed since 1982, the NHTSA 408 and 410 programs. In Fiscal Year 1991, $15 million has been appropriated for Section 408 and $5 million for Section 410. $4 million in Fiscal Year 1990 funds remains available for Section 410.

In early drafts of its modifications to these programs, the Bush Administration suggested the consolidation of the 408 and 410 programs into one program. MADD thinks it was a suggestion well taken. We have learned a substantial amount since 1982 about what works and what does not in combating drunk driving. MADD believes it is time to consolidate and streamline the two incentive grants programs in existing law in the interest of targeting our efforts on those countermeasures which have demonstrated the greatest ability to save lives.

MADD believes that not all countermeasures are equal. While many may be useful, some are of more immediate importance than others. That is why we suggest a continuation of a feature found in Section 408 and 410: the separation of countermeasures into two tiers, a set of criteria which would qualify a state for a basic grant and a set of supplemental criteria, which, once basic eligibility is achieved, would provide additional support for the adoption of additional countermeasures.

Mr. Chairman, MADD would urge you to adopt a program which includes the following basic criteria: administrative license revocation, a .08 BAC per se definition of intoxication, the use of sobriety checkpoints, mandatory 48 hours incarceration for a repeat offenses and self-sufficient Stop-DWI programs.

In the course of the last year, MADD activists across the country have been working in state capitols urging adoption of administrative license revocation, designed to deliver swift and certain punishment to drunk drivers and safer roads for all. In

1988, the Insurance Institute for Highway Safety found a 9% decrease in nighttime fatal crashes in those states which adopted administrative revocation. NHTSA in a separate study confirmed this decrease.

Administrative revocation is legally sound, it works and it saves lives. MADD has been working with a coalition of insurance and auto safety groups convened by the National Transportation Safety Board and NHTSA dedicated to making advances on administrative revocation across the country. We are encouraged by results to date.

The major new item which we hope you will put on your agenda is the adoption of .08 BAC as the per se definition of intoxication in every state. California, so often a bellwether state, has adopted .08. Three other states have also moved to .08 and we believe, on the basis of what we see around the country, that .08 is the next major advance to be made in combating drunk driving across the country. Congress has set the intoxication level for pilots and commercial truck drivers at .04. There is ample scientific evidence which shows that impairment occurs as low as .02 BAC and virtually all drivers are impaired at .08. It is clearly time to move to .08 nationwide.

Mr. Chairman, MADD strongly favors the inclusion of .08 among basic criteria employed in any new incentive grant program. However, to avoid making states ineligible for grants while they revamp their BAC level, we would suggest that states be given two years to adopt .08 during which time they would qualify for a basic grant provided they met the other basic criteria.

In the aftermath of the Supreme Court's finding in 1990 that sobriety checkpoints were a constitutional means of deterring and apprehending drunk drivers, MADD favors a major push to have this very effective countermeasure employed by the states. MADD also continues to support the development of self-sufficient programs at the state level which provide ongoing support for STOP-DWI efforts.

MADD would suggest continuing the practice of awarding a state 30 of its 402 allocation if it qualifies for a basic grant.

MADD has been listening, Mr. Chairman, to many state highway safety representatives who argue that federal programs are often too rigid and do not give enough credit for performance as opposed to the achievement of certain criteria devised in Washington. We think the states make a good point in this regard and are prepared to see performance rewarded. We would therefore suggest that any state which achieves a 5% average reduction in alcohol-related fatalities over the 5 year period prior to their application for an incentive grant be given credit for that performance and have one of the basic criteria waived. A state so characterized would therefore have to meet only four basic criteria, not five.

Mr. Chairman, once a state is eligible for a basic grant, MADD believes that the state should continue to show progress in order to remain eligible. MADD therefore suggests additional supplemental criteria, namely, mandatory BAC testing in the case of crashes which result in death or serious injury; prohibitions on open containers and the confiscation of license plates of those who drive under a revoked or suspended license. For each supplemental criterion adopted, MA0D suggests that the state receive an additional 5% of its 402 allocation.

MADD suggests that a state could be eligible for a five-year period if it achieved basic eligibility and adopted at least two supplemental criteria during its period of eligibility. Basic eligibility alone should be for a maximum of three years. The intent here is to provide an incentive for states to maintain momentum.

Mr. Chairman, MADD would urge the committee to provide adequate funding for the effort to combat drunk driving which will send a signal to the states and the general public that, as a nation, we are serious about this effort. MADD would suggest a $25 million authorization for Fiscal Year 1992 for a consolidated 408 and 410 program rising to $50 million in Fiscal Year 1993 and $75 million in Fiscal Year 1994. The source of funding for this program should be the Highway Trust Fund; the money should remain available until expended.

In summary, Mr. Chairman, I would like to touch on the Administration's proposal and the use of highway funding sanctions versus incentive grants.

MADD enjoys excellent working relationships with the Department of Transportation. Secretary Skinner has been steadfastly accessible to MADD and supportive of our cause. I should add that President Bush has been equally supportive and has used the authority of the Presidency to advance the cause of saving lives on our highways.

We are, however, disappointed with the product offered by the Department of Transportation as regards modifications to existing federal law designed to combat drunk driving.

As noted earlier, we see no justification for lumping drunk driving in with a host of other highway safety initiatives. The concentration on drunk driving under existing law in a separate and focused program is warranted by the facts facing us on

our nation's highways. Indeed a Gallup poll currently underway for MADD shows that the public considers drinking and driving a far greater highway safety problem than poor highways or highway construction. This is no time to let down our guard on drunk driving.

Secondly, we see no justification for holding alcohol safety incentive grants constant at $25 million per year, while construction-related grants grow steadily over five years. There are ample funds available for "safety" under the Federal Highway Administration program today. Why the Federal Highway Administration needs to encroach on the resources of the much smaller NHTSA program has not been adequately justified.

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Mr. Chairman, we at MADD have often been asked why, if highway funding sanctions have worked so well in achieving a uniform minimum drinking age of 21, we have not employed this withholding tactic in areas such as administrative license revocation.

There are at least two differences between "21" and the countermeasures we have outlined today. One is that the adoption of 21 at the state level represented no particular financial burden to a state. That is not the case with administrative license revocation where there are initial startup costs. Secondly, and more importantly, the federal action on "21" occurred at a time when the states were simply not adopting 21; the momentum at the state level had halted. Today, we see progress at the state level on administrative revocation and .08 as well as other countermeasures.

Having said this, let me assure you that MADD as an advocacy organization has no philosophical aversion to highway funding sanctions. Whether to use funding sanctions or incentive grants is a tactical question; the goals are the same and the results are what we are interested in. Mr. Chairman, we look to you and other members of Congress to define the tactics to be employed in pursuit of saving lives, a goal long supported by MADD and this Committee.

It has been a pleasure to appear before you this morning and I would be pleased to answer any questions you might have.

Thank you.

Senator BRYAN. Thank you very much. It is a pleasure to have the committee have your testimony. Let me begin with you, if I may, Ms. Sadoff. This is a legislative year for a number of States that have biannual sessions, as you know. What progress are you making with the .08 standard? Your testimony, as I recall, refers to California as a bellwether State. You have been successful there, and I believe you mentioned three other States. Perhaps California was included in that. How are you coming on the State-by-State approach?

Ms. SADOFF I think that California has been very exciting to all of us; that such a large population State would find .08 acceptable and in the past many months found success with it.

I think that they are a role model for the rest of the country. .08, the people in this room understand the concept very well, but it is very difficult to explain to the general public, so it is an education effort to allow people to understand how high .10 is, what .08 means, what the Federal standards are for pilots and other modes of transportation, trucking for example. Part of MADD's effort, of course, is to educate on the need for this legislation, and I am hopeful that we will see more States with California's lead moving to the standard, because we believe that it is definitely lifesaving.

Senator BRYAN. If memory serves me correctly we used to have a fairly universal .15, then we moved to .10. What does your data show with regards to that?

Ms. SADOFF It's been in effect, I believe, since January. It has probably been too short a time to effect the comparison.

Senator BRYAN. Do you have any data that would indicate the number of alcohol-related accidents, including fatalities, of course, in which .08 blood alcohol levels were involved?

Ms. SADOFF I would have to say that I could get that information for you and supply it for the record, if you please.

Senator BRYAN. I am just interested in what the data base is. There has been some controversy, as you know, at the State levels whether to go those standards or not.

Ms. SADOFF I think we are allowing people to drive impaired at .10. The scientific evidence shows that .02 or .05 people are driving with far too much alcohol and, of course, we would push for the designated driver, someone with no alcohol in their system, so I think it is an education effort and I know that in California the arrest rate is up at that level and many of the prosecutions were not being made at .10, so they are seeing better prosecutions at that level.

Senator BRYAN. I might just say parenthetically, as you know you have a very effective organization. You do an excellent job. You should know that we understand that, those of us who live in Nevada.

Ms. Claybrook, let me turn to you. You mentioned the darkened window. Now, that has been around for a long time at the municipal ordinance level. It has moved to the State legislative level in some States in recent years. Can you enlighten me? What do you have in mind? You made reference that you, in fact, promulgated such a standard back in 1981 that never went into effect. What are we talking about?

Ms. CLAYBROOK. We believe with the growing number of older drivers that the darkened windows are a danger. The reason darkened windows came into effect was not only because the difficulty of sunshine but the heat in cars and the stress that heat puts on air conditioning. Manufacturers just started putting darkened windows in their cars to reduce the heat levels as well. We believe that the amount of darkness that is allowed and put into cars today is much too much and has a severe affect on nighttime driving and it should be substantially reduced. The darkness should be substantially reduced, and I would be delighted to submit for the record, if you would like, a copy of the rule that was actually issued in 1981 which could serve, it seems to me, as a pretty good guide. It did more than just address darkened windows, I should say, it

also addressed the whole issue of conspicuity and the ability of the driver to see. It dealt with the issue of the design of the rear windows and whether or not there were louvers and other things that prevented the ability of the driver to see at all times.

Senator BRYAN. That is helpful. Your view is that the standard used by automobile manufacturers may be too opaque or too translucent or whatever the criteria would be?

Ms. CLAYBROOK. Most of them don't have particular standards. They do what they want to do.

Senator BRYAN. Because the thrust of legislation, at least at the municipal level and at the State level now, is the flip side of that. There are those who buy automobiles new or used and have them customized by making them even much, much darker than any manufacturer has ever proposed. I think that is the thrust of what is happening at the State or local level. You are suggesting that the approach needs to go from the manufacturing perspective.

Ms. CLAYBROOK. That's correct.

Senator BRYAN. You commented on the head injury proposed rulemaking as you understood the testimony from General Curry and you feel it ought to be far broader than that. I have not had a chance to read your testimony. I did not get it until this morning. Do you address that in more detail there?

Ms. CLAYBROOK. We do. We mention that the kind of energy-absorbing structures that we are talking could be metal, they could be padding, but they are energy-absorbing structures in the whole upper portion of the car where the head is likely to be, and it involves two things. One, energy-absorbing structures, and the other removing objects and including, by the way, like motorized systems for passive belts can often be a real source of harm, and then in addition the whole issue of roof crush and the impact that the head can have on the roof.

So, if we want to protect against head injury, it is really fairly inexpensive. It is not as costly as side impact protection, it is not as costly as passive restraints or airbags. Some manufacturers are already doing this to some small extent, but we believe that a standard should be issued and could be issued rather readily.

I believe it was 5 or 7 years ago that NHTSA's research showed that you could reduce head injury by 50 percent in crashes of 20 to 25 miles per hour with proper energy-absorbing provisions in that part of the vehicle, so the research has been substantially done at that point.

The big issue on the interrelationship between head injury and biomechanics research is that in order to properly design the instruments to measure head injury, you have to have money to support biomechanics research; it is expensive research. NHTSA has been doing research on head injury in recent years. Partly sparked by the word for the side-impact protection standard about which we have been raising a fuss for more than 10 years, so they have been doing some of this research.

We feel that this is something the manufacturers, first of all, could do on their own. The fact that we have to require a standard is unfortunate, because the manufacturers know how to do this and they could do it in next year's cars and the year after, but absent their willingness to do this, we think it is essential that your legis-

lation require the issuance of standards governing head injury, not only in side-impact protection but in rollover protection and in frontal crashes where the head goes above the level of the airbag. So, the airbag is going to make a major difference in head injury, but in addition there are many crashes in which the airbag is not applicable or where the human body touches the other structures.

Senator BRYAN. The thrust of your comment with respect to the agency's approach is you felt it was far too narrow and did not consider the types of things about which you just testified. Share with us what the relationship is between those of you who are in the safety advocate community and with the agency. Is there ongoing dialog, Ms. Claybrook? I mean, do you communicate with them either informally or formally as they are about ready to embark upon this proposed rulemaking?

Ms. CLAYBROOK. I'll say we attempt to. I did pay call on General Curry when he was first named for office and did have a meeting with Secretary Skinner and I guess I went to one or two meetings that were held after that. Unfortunately when some criticism was leveled at the agency by the center for auto safety, the agency decided that some of the more outspoken safety advocates shouldn't grace their halls, and so we have not been invited back. I will say that General Curry as he left today asked me to have lunch with him.

Senator BRYAN. That may be a sign.

Ms. CLAYBROOK. So may be criticism.

Senator BRYAN. You have to discuss who is picking up the check.

Ms. CLAYBROOK. I always insist on a Dutch treat. But I think that the—there are two ways to get the agency to act, or three; one is legislation, one is petitioning them and then suing them if they don't do it, and a third is publicity. And we have been pursuing all of those routes in our advocacy. We certainly will also pursue just personal contact in urging them to act.

The agency is good-hearted. I am not suggesting it is not. There are lots of barriers to action, including the Office of Management and Budget, including lack of resources, including lack of expertise. I would say, Mr. Chairman, that is really important and that is you look at NHTSA's budget in 1975 or in 1980, you look at it today, it has had a reduction of about 30 to 40 percent inflation adjusted. This is expensive research, but it is so inexpensive compared to the payoff and it is so little compared to all these other agencies.

On alcohol safety we put $25 million a year. There is not $25 million a year available for crashworthiness research. It is about $8 or $10 million a year. It is a tiny amount of money, and I would urge that if nothing else that your legislation try and enhance the amount of money available and demand that it be spent on crashworthiness research.

Let me just say the things that have been stopped since 1980. The research safety vehicle program which showed you could have a car crash, say, of 50 miles an hour has been stopped, discontinued. The large truck safety research program stopped. Fuel economy research stopped. Many of the important research programs of this agency have been discontinued and as a result the body of expertise in the individuals who did the contract work for the agency have stopped. I think that perhaps Don Friedman, who is one of

those researchers, could tell you what has happened to this community. It has been disemboweled and, as a result, when the auto industry comes in and says we can't do this and we can't do the other thing, there is no ability of the agency to dispute that. They don't have the data and the information available with which to rebut that. And so it is very, very essential, particularly these delicate areas where the agency is measuring injury level.

Injury level measurement is a new thing for this agency. When it was first enacted and put into law in the 1960's we didn't even understand you could measure injury level or we were just beginning to understand that. Now injury levels can be predicted with a great deal of capability. The number of lives that are going to be saved by airbags based on the rule world data that has just come out is almost identical to the prediction on that that was made based on NHTSA's research but NHTSA spent $150 million on airbag research. They only spent $15 million on rollover research but yet there are 10,000 people killed a year in rollover crashes, so there is a tremendous capability to mitigate and prevent these injuries, and when you multiply that, the deaths times the number of injuries, it is enormous. 500,000 people are hospitalized every single year because of auto crashes. Think of the impact that has on the medical care system, the cost of health insurance, the cost of doctors' treatment, taking it away from other areas where we can't prevent these kinds of harm. Here it is preventable and that is the magnificent and fascinating thing about this area of work, so I urge you to make a tiny, tiny investment and see the payoff just roll off the production line.

Senator BRYAN. I thank you very much.

Mr. Ditlow, a question. You have looked at our proposed draft and you specifically addressed the judicial challenge provisions that used to exist and the fact that over the period of years when they were in effect that there were only two court cases, I recall. Are you satisfied with the provisions of the draft?

Mr. DITLOW. The present draft doesn't have provisions in it and we would like to go back to the provision that was in last year's bill, but expand to the closing of the investigations as well as the denials of the petitions.

Senator BRYAN. So,you prefer to leave S.673 provisions but think they ought to be expanded even further?

Mr. Ditlow. That is correct, Senator Bryan. I would like to add one personal thought to Ms. Claybrook's remarks in relation with the agency. As she well knows even the in the best of times relationships between consumer advocacy and watchdog groups are a little testy.

Ms. CLAYBROOK. Clarence and I had our testy moments.

Mr. DITLOW. In part this is a resource problem. It is very difficult to get fatal accident reporting information, it is very difficult to get information from the technical reference library at the agency. And it handicaps the ability of the public to comment and participate in rulemaking. And I would urge you to pay some attention to this area as well.

Senator BRYAN. Mr. Ditlow, let me make sure I understand your comments. Are you suggesting that the agency either purposely or by design withholds that information or, as Ms. Claybrook was sug-

gesting a moment ago, that through a starvation diet the agency doesn't have the resources to develop that information?

Mr. DITLOW. Well, we aren't privileged to why they do what they do. We suspect that the major portion of the problem is due to a starvation of resources. But the second thing is when you—when there is some set of areas down there of rulemaking and you are taking an opposite position it seems to delay more frequently in those areas than in others.

Senator BRYAN. I'm sure you will make us aware of those instances in which you believe that information is available and not forthcoming and we will be happy to be helpful in that regard.

Let me thank each of you as panelists as we have in the past. We appreciate your testimony. It is always helpful to hear from you. Thank you so very much.

Our second panel this morning will consist of Mr. Thomas Hanna, President of the Motor Vehicle Manufacturers Association, and Mr. Gregory Dana, who is the Vice President and technical director, the Association of International Automobile Manufacturers. We welcome these panelists to our hearing as well.

Mr. Hanna, as soon as you are comfortably seated we will hear from you first, sir.

STATEMENT OF THOMAS HANNA, PRESIDENT, MOTOR VEHICLE MANUFACTURERS ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS

Mr. HANNA. Thank you very much, Mr. Chairman. I appreciate the invitation and I am here on behalf of the MVMA and its members and I want to thank you for that invitation. I think MVMA and its members have established a record in responsible contributing partners in efforts to reduce motor vehicle occupant protection and enhanced highway safety.

Vehicle safety has all been a integral part of the design, engineering, and manufacturing process in domestic motor vehicle industry. In fact, is of the first 20 motor vehicle safety standards promulgated under the National Traffic and Motor Vehicle Safety Act codified practices already employed by manufacturers. Since those days U.S. manufacturers have been in the forefront of further efforts to reduce deaths and injuries on our highways. And today competitive pressures among the auto companies, both foreign and domestic, are significant, and it is clear from even a casual review from advertised safety features, such as airbags and antilock brakes, that safety is an area of strong competition. Market forces provide a strong impetus to manufacturers to incorporate new safety technology as early as possible. As a result, manufacturers are equipping cars with antilock brakes, adjustable upper anchorages, and other safety features even though there are no Federal mandates requiring the inside to do so. Similarly, additional safety technology is being extended to many light trucks, vans, and multipurpose vehicles in advance of Federal requirements.

However, considerable resources and effort are required to transfer the results of emerging R&D safety technology into practical reliable devices, features, and designs and to develop quality manufacturing processes to produce them. Some safety devices, like airbags, for example, have to be uniquely designed for each passenger

car and light truck model. Each new design must be thoroughly tested. In addition, a new manufacturing process requires fine-tuning before it can be produced in volume and at the level of quality that customers demand. Consequently, manufacturers are not able, in some instances, to implement new safety technology immediately, but this engineering prudence does not represent reluctance to adopt potential safety improvements. It is in the interest of safety that manufacturers take the time necessary to assure the quality and integrity of their products.

Considerable research and analysis also is required to properly assess safety issues and develop testing criteria and procedures for new safety standards. In fact, the NHTSA has been extremely productive over the last 10 years in accomplishing these tasks. The most significant rulemaking taken during this period was the occupant protection standard, and it was successful because it was designed in recognition of industry leadtime requirements as well as the important safety performance required by the standard. Other key NHTSA efforts during the 1980's resulted in the increased use of child restraints and safety belts, decreased drunk or impaired driving and the installation of center high mounted stop lamps on passenger vehicles. Quite a number of additional safety requirements have been recently issued by NHTSA and they were described by the administrator this morning. I will not go into those.

This record of accomplishment by NHTSA over the past decade has been helped by an increasingly open relationship with motor vehicle manufacturers. We believe the regulatory process is serving its intended purpose and that Congress should not overturn this longstanding practice by mandating certain actions. Manufacturers' concerns about safety extend beyond the occupant protection afforded by vehicles themselves. They are convinced that substantial improvements to highway safety can be realized when effective actions on crash causation. Extensive basic research is needed to understand why drivers behave as they do, what influences their decisions, and how they acquire and process information that leads to those decisions, and how they interact with the vehicle. From these efforts ways must be developed to provide drivers with the kinds of information they need to make correct decisions and to provide it in the way that will not distract from the driving task.

The main focus on driver behavior to improve safety must continue to be reducing drunk or impaired driving and increasing safety belt usage because that is where the big gains can be made. During the 1980's the Federal Government, particularly DOT and groups such as the Mothers Against Drunk Driving, and Traffic Safety Now, spent countless hours educating the public about individuals' responsibility to drive safely by pushing for tougher laws and programs to reduce aggressive driving behavior. Combined with advancement in vehicle and highway designs these initiatives have brought the fatality rate down to 2.17 for 100 million vehicle miles traveled, an all-time low, among the best in the world, but nobody's satisfied with that and the work will continue.

While 38 States and the District of Columbia are now covered by belt use laws, actions needed to be taken to enact laws in remaining States to close any loopholes that might not exist such as not including van and truck occupants and to press for changes that

will allow aggressive primary enforcement. Congress should consider Federal incentives to States based on the passage of mandatory safety belt use laws and attaining higher safety belt usage rates and finally the next decade represents an unprecedented workload for manufacturers at a time when vehicles sales are down considerably, thousands of workers are laid off and there is more competitive pressure than ever. The industry must meet extremely stringent emission and alternative fuel vehicle requirements and the new safety standards while achieving fuel economy standards and offering other attributes customers demand, safety, convenience, comfort, performance, utility, at a price they can afford. We ask that you consider this perspective in mind, Mr. Chairman, as motor vehicle legislation is considered. Thank you very much.

[The prepared statement of Mr. Hanna follows:]

PREPARED STATEMENT OF THOMAS H. HANNA

Good morning. I am Thomas H. Hanna, President of the Motor Vehicle Manufacturers Association. On behalf of MVMA and its members, I want to thank you for the opportunity to testify on motor vehicle and highway safety issues. MVMA and its members have established a record as responsible contributing partners in efforts to improve motor vehicle occupant protection and enhanced highway safety.

Vehicle safety has always been an integral part of the design, engineering and manufacturing process in the domestic motor vehicle industry. In fact, fifteen of the first twenty Federal Motor Vehicle Safety Standards promulgated under the National Traffic and Motor Vehicle Safety Act coddled practices already employed by manufacturers.

Since those early days, U.S. manufacturers have been in the forefront of further efforts to reduce deaths and injuries on our highways. Individual manufacturer's own research, sponsored studies, and cooperative programs through have produced information on human injuries in vehicle crashes that have led to major improvements in crash testing procedures, test dummies, instrumentation, data analysis techniques, and vehicle designs. These improvements allow manufacturers and the government to prioritize highway and safety needs and be much more confident in predicting real world performance of design improvements. Consequently, the current state of occupant protection performance in vehicles is very mature.

Yet today, competitive pressures among the auto companies, both foreign and domestic, are significant, and it is clear from even a casual review of advertised safety features—such as air bags and antilock brake systems—that safety is an area of strong competition. Market forces provide a strong impetus to manufacturers to incorporate new safety technology as early as practicable.

As a result, manufacturers are equipping cars with airbags, antilock brakes, adjustable upper anchorages for front shoulder belts and other safety features even though there are no federal mandates requiring the industry to do so. Similarly, additional safety technology is being extended to many light trucks, vans and multipurpose vehicles (MPVs) in advance of federal requirements.

It is important to keep in mind, however, the considerable resources and effort that are required to transfer the results of emerging R&D safety technology into practical, reliable devices, features, or designs, and to develop quality manufacturing processes to produce them. Some safety devices, like air bags, for example, have to be uniquely designed for each different passenger car and light truck model. Each new design must then be thoroughly tested. In addition, a new manufacturing process requires fine-tuning before it can be produced in volume and at the level of quality that customers demand. Consequently, manufacturers are unable, in some instances, to implement new safety technology immediately. But this engineering prudence should not be interpreted as a reluctance to adopt potential safety improvements. It is in the interest of safety that manufacturers must take the time necessary to assure the quality and integrity of their products.

Considerable research and analysis also is required to properly assess safety issues and develop testing criteria and procedures for new safety standards. In fact, the National Highway Traffic Safety Administration (NHTSA) has been extremely productive over the past ten years in accomplishing these tasks. The most significant rulemaking taken during this period was the occupant protection standard and it was successful because it was designed in recognition of industry leadtime requirements and practical considerations as well as the important safety performance

required by the standard. Other key NHTSA efforts during the 1980's resulted in the increased use of child restraints and safety belts, decreased drank or impaired driving and the installation of center high mounted stop lamps on passenger vehicles. A number of additional safety requirements have been issued recently by NHTSA, such as improved side impact protection for passenger cars and automatic restraints for light trucks, vans and MPVs. Several more rules are in their final stages, including the application of passenger car safety standards to light trucks and MPVs, such as center high mounted stop lamps and roof crush resistance.

This record of accomplishment by NHTSA over the past decade has been helped by an increasingly open relationship with motor vehicle manufacturers compared to what existed in the late seventies. New safety standards are being set expediently, which recognize the needs of the motoring public as well as the concerns of automakers. We believe the regulatory process is serving its intended purpose, and that Congress should not overturn this long standing practice by mandating certain actions.

Motor vehicle manufacturers' concerns about safety also extend beyond the occupant protection afforded by vehicles themselves. Manufacturers are convinced that substantial improvement to highway safety can be reed from effective actions on crash causation. Extensive basic research is needed to understand why drivers behave as they do, what influences their decisions, how they acquire and process information that leads to those decisions, and how they interact with the vehicle. From these efforts, ways must be developed to provide drivers with the kinds of information they need to make correct decisions; and to provide it in a way that will not distract from the driving task, including head-up display; better roadway signs, markings and lighting; improved driver training and licensing; and intelligent vehicle-highway systems. We believe that programs of this magnitude must be supported at the Federal level.

But the main focus on driver behavior to improve safety must continue to be reducing drunk or impaired driving and increasing safety belt usage. During the 1980's, the federal government, particularly the Department of Transportation, and groups such as Mothers Against Drunk Driving (MADD) and Traffic Safety Now, spent countless hours educating the public about the individual's responsibility to drive safely by pushing for tougher impaired driving laws and mandatory safety belt use laws and programs to reduce aggressive driving behavior. Combined with advancements vehicle and highway designs, these initiatives have brought the fatality rate down to 2.17 per 100 million vehicle miles traveled—an all-time low, and among the best in the world.

While thirty-eight states and the District of Columbia are now covered by belt use laws, actions need to be taken to enact laws in the remaining states, to close any loopholes that might exist such as not including truck and van occupants under the laws and to press for changes that would allow aggressive, primary enforcement for lack of safety belt use. Congress should consider Federal incentives to states based on the passage of mandatory safety belt use laws and attaining higher safety belt usage rates.

Finally, the next decade presents an unprecedented workload for motor vehicle manufacturers at a time when vehicle sales are down considerably, thousands of workers are laid off, and there is more competitive pressure than ever. The industry must meet extremely stringent emission and alternative fuel vehicle requirements and the new safety standards I mentioned earlier, while still achieving fuel economy standards and offering the other attributes consumers demand—safety, convenience, comfort, performance and utility—at a price they can afford. We ask Congress to keep this challenge and our perspective on the issues addressed in this testimony in mind as motor vehicle legislation is considered in the future. We appreciate and thank you for allowing us the opportunity to testify today.

Senator BRYAN. Thank you very much, Mr. Hanna. Mr. Dana, we will hear from you now.

STATEMENT OF GREGORY DANA, VICE PRESIDENT AND TECHNICAL DIRECTOR, ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS

Mr. DANA. Good morning, Mr. Chairman. Thank you for this opportunity to appear before you today. We are pleased to appear before the subcommittee to offer our views on highway and motor vehicle safety issues and the activities of the National Highway Traffic Safety Administration. I would like to comment that we haven't

had time to review the draft thoroughly and get comments back from our members, but we will be happy to do that for the record.

AIAM members have been the forefront of the development of advanced safety technology and continue to pursue safety enhancements. The consuming public is more aware of safety features and is demanding them in the motor vehicles they buy. Consumer demand is clearly a strong motivation for vehicle designers as will be seen by the rapid introduction of airbags in virtually all car models over the next few years.

Many of the issues of concern in last year's reauthorization bill have been answered by NHTSA's regulatory program. Revised side-impact standards for passenger cars have been promulgated, rear seat lap/shoulder belts are now found in all new vehicles and virtually all of the passenger car standards have been or will be extended to light truck and multipurpose vehicles. The regulatory program at NHTSA is active and working well. There is no need for Congress to impose detailed regulatory requirements or timetables on the agency via statute.

The policy guidance Congress has provided is successfully allowing NHTSA the flexibility to establish the most appropriate regulatory approach and schedule. Unfortunately from our quick review of the bill it appears that it continues the approach of S. 673 in setting these detailed requirements.

At the subcommittee hearing on S. 591 General Curry announced plans for a strong public education effort to increase seat belt use to the 70-percent level. We strongly endorse this effort. Universal seat belt use by the public is the single most effective thing that can be done in terms of occupant protection for the variety of real-world crashes that occur.

Further, NHTSA's leadership in drunk driving awareness and seat belt use have been instrumental in the continuing decline of the fatality rate. It is important that these nonvehicular safety programs continue.

We understand the desire to provide consumers with an objective safety rating system for motor vehicles, but we continue to believe that an objective and reliable system has yet to be developed. The NCAP program currently run by NHTSA provides data on only one size occupant in one of many possible crash situations. The NCAP test provides information only in relation to a direct head-on barrier crash at 35 miles per hour. It provides no information on other accident situations or on the general crashworthiness of the vehicle. The addition of a side-impact NCAP test regime, as suggested by NHTSA, would look only at one additional accident event and would likely confuse the situation further.

All motor vehicles must meet all applicable Federal safety standards before they can be sold. This fact should obviate the need for a safety or vehicle performance rating system. If there is some area of vehicle safety that is not adequately covered by the current standards, then development of a revised or new standard to address that issue is appropriate. Reminding and assuring consumers that all vehicles meet all the standards is more sensible than prescribing additional test programs that highlight one or two aspects of vehicle safety and will inject confusion in the minds of most purchasers.

Let me clarify one point that was made in earlier testimony, if I could, by Ms. Claybrook about the darkened windows. We believe, I think as you do, Senator, that this is an aftermarket problem. There are, in fact, requirements placed on vehicle manufacturers to meet a 70-percent light transmittance in their vehicles, which we don't believe represents a problem for the law enforcement personnel. We strongly support the need to keep inappropriately darkened windows out of the marketplace. In summary, NHTSA is fulfilling its mandate under the law and we hope that Congress will continue to provide general guidance to the agency when needed.

Thank you again for the opportunity to present our views. I would be happy to answer any questions you might have.

[The prepared statement of Mr. Dana follows:]

PREPARED STATEMENT OF GREGORY DANA

Good Morning, my name is Gregory Dana. I am the Vice-President and Technical Director at the Association of International Automobile Manufacturers (AIAM).[1] AIAM is a trade association that represents companies which distribute passenger cars and light trucks in the United States that are manufactured both here and abroad. The association represents 21 companies which employ thousands of Americans in their distribution, transportation and manufacturing operations. The international automobile industry, including dealers, suppliers, port and assembly line workers and others in the United States provides jobs to more than 300,000 Americans.

AIAM is pleased to appear before the subcommittee today to offer its views on highway and motor vehicle safety issues and the activities of the National Highway Traffic Safety Administration (NHTSA).

AIAM members have been in the forefront of the development of advanced safety technology for motor vehicles and continue to pursue safety enhancements. The consuming public is now more aware of safety features and is demanding them in the motor vehicles they buy. Consumer demand is clearly a strong motivation for vehicle designers as will be seen by the rapid introduction of airbags in virtually all car models over the next few years.

Many of the issues of concern in last year's reauthorization bill have been answered by NHTSA's regulatory program. Revised side impact standards for passenger cars have been promulgated, rear seat lap/shoulder belts are now found in all new vehicles, and virtually all of the passenger car standards have been or will be extended to light trucks and multipurpose vehicles. The regulatory program at NHTSA is active and working well. There is no need for Congress to impose detailed regulatory requirements or timetables on the agency via statute. The policy guidance Congress has provided is successfully allowing NHTSA the flexibility to establish the most appropriate regulatory approach and schedule.

At the subcommittee hearing on S.591, General Curry announced plans for a strong public education effort to increase seat belt use to the 70% level. We strongly endorse this effort. Universal seat belt use by the public is the single most effective thing that can be done in terms of occupant protection for the variety of real world crashes that occur. Further, NHTSA's leadership in drunken driving awareness and seat belt use have been instrumental in the continuing decline of the fatality rate. It is important that these "non-vehicular" safety programs continue.

We understand the desire to provide consumers with an objective safety rating system for motor vehicles, but we continue to believe that an objective and reliable system has yet to be developed. The NCAP program currently run by NHTSA provides data on only one size occupant in one of many possible crash situations. The NCAP test provides information only in relation to a direct head-on barrier crash at 35 mph. It provides no information on other accident situations or on the general

[1] AIAM represents: American Honda Motor Co., Inc.; American Suzuki Motor Corporation; BMW of North America, Inc.; Daihatsu Motor Co., Ltd.; Fiat Auto U.S.A., Inc.; Hyundai Motor America; Isuzu Motors America, Inc.; Jaguar Cars, Inc.; Maserati Automobiles, Inc.; Mazda Motor of America, Inc.; Mitsubishi Motor Sales of America, Inc.; Nissan North America, Inc.; Peugeot Motors of America, Inc.; Porsche Cars North America, Inc.; Rolls-Royce Motor Cars Inc.; Rover Group USA, Inc.; Saab Cars USA, Inc.; Subaru of America, Inc. Toyota Motor Sales, U.S.A., Inc.; Volkswagen of America, Inc.; Volvo North America Corporation; and Yugo America, Inc.

crashworthiness of the vehicle. The addition of a side-impact NCAP test regime, as suggested by NHTSA, would look only at one additional accident event and would likely confuse the situation further.

All motor vehicles must meet all applicable Federal safety standards before they can be sold. This fact should obviate the need for a safety or vehicle performance rating system. If there is some area of vehicle safety that is not adequately covered by the current standards, then development of a revised or new standard to address that issue is appropriate. Reminding and assuring consumers that all vehicles meet all the standards is more sensible than prescribing additional test programs that highlight one or two aspects of vehicle safety and inject confusion in the minds of most purchasers.

In summary, NHTSA is fulfilling its mandate under the law, and we hope that the Congress will continue to provide general guidance to the Agency when needed. Thank you for this opportunity to provide our views, and I will try to answer any questions you may have.

Senator BRYAN. Thank you very much, Mr. Dana. Let me ask a question to both of you. Mr. Hanna, you indicated, and Mr. Dana did as well, that the industry concentrates and spends a great deal of time and effort and money on safety. My question to you is, What kind of safety programs are currently being undertaken by the industry, and from the standpoint of the American motorists, what kind of safety improvements are we likely to see in the near term in which the industry is going to bring to the market?

Mr. HANNA. Well, probably the most significant thing is the continued implementation of the airbag, and that is—that is well underway. As we indicated in previous testimony, by the middle of this decade we will be practically across the board in automobile light trucks, so we expect that to happen and that is the single most important thing, I think.

Second, the car manufacturers are working strenuously to comply with the new regulatory requirements that have been issued by the administration. I've been impressed, as you have, that every time the General comes up here he is—and I don't mean that in a sarcastic way at all, they make progress, and they do things. But these take a lot of time and work and effort. In addition to that, there is a lot of work going on, and some of the things that were referenced in earlier testimony and working draft, such as the head injury, that is not a simple problem. There was testimony here that manufacturers can do it next year if they just wanted to. Well, that is just not true, Mr. Chairman. There are other complicating factors in that. One of them is the matter of conspicuity. You have to put padding someplace, and you don't want to impede people's vision in and out of the car. There is also the problem that is, as my understanding, and I am not an expert in biomechanics, but it is my understanding that it is not a simple matter just to put padding that will impact the head. That you may in fact transfer jolts from the head to the neck as you do that, but it is a complicated system problem. Car companies, as NHTSA, are working on this and I am sure there will be progress made on that but it is not a casual thing.

There is also work going on, for example, in the matter of pedestrian safety, and NHTSA has been looking into rulemaking. I am not sure at the moment what the status of it is but they have been looking into that matter and we think there are some things that can be done and looked into automobiles as they are produced. That is complicated, however, for the design of the commend for aerodynamic purposes so there is a lot of work going on. There is

testing to make cars more reliable. As you know, there is a new side-impact standard that is now being implemented. Those are some of the things.

Senator BRYAN. Mr. Dana, how about from your perspective?

Mr. DANA. I second what Mr. Hanna has just said. There is a lot going on in terms of meeting new standards that have come out. And that certainly is a fairly full plate for the manufacturers. It is clear that manufacturers are constantly striving to develop new and better ways of protecting occupants in vehicles. I can't give you any more specifics about what is going on beyond what Mr. Hanna has said. Much of the advanced work going on is proprietary to the manufacturer, but clearly I agree with all that Mr. Hanna has said.

Senator BRYAN. Acknowledging that both of you have said that there is an effort underway to comply with new rules which have been proposed by NHTSA, it kind of suggests that the industry responds or reacts to these standards, rules promulgated by NHTSA, and doesn't initiate anything on its own. I mean, the automobile industry obviously has a enormous resource and capability. They manufactured the vehicle. Is that a fair observation or fair criticism, Mr. Hanna? I don't want to take what you said out of context but let me give you a chance to respond.

Mr. HANNA. No, I don't think it is, because, as you know, manufacturers are not required under the law to go 100 percent on airbags. They are doing that ahead of schedule and they are doing it because they find that they can do it, the technology is mature and importantly as I made reference in my testimony, because people are receptive often and I think that is awfully important because to get people to be willing to pay for the price of the automobile, these things included in it, the public positive reaction to it is very good, but in terms of both airbags and antilock brake systems, they are being implemented further and in advance of the regulatory requirements.

And in fact, I think sometimes we just tend to overlook the amount of the safety that is built into the basic automobile itself. Cars had adequate, very well functioning braking systems before there was ever an administrative agency. I mean, car manufacturers are constantly looking at the matter of how to make cars more controllable, how you can stop and start in handling them. They are doing research on rollover, tilt tables, round-robin on that, finding the center of gravity of vehicles. They are working on these kinds of things constantly. It is a tremendous amount of labor to integrate into the front of an automobile the requirements for crush. At the same time, you are working to improve fuel economy standards, for example. It is a tremendous level of effort that is going on in that. We don't hold a press conference constantly as that work is going on, but it is awfully good work and I think productive. It does get reflected in each sequence of automobiles and they are offered on the market.

Senator BRYAN. I think you will concede in the past you have heard the reaction by at least certain elements of the industry that safety doesn't sell. I guess the best example of that that comes to my mind was in 1956 Ford, way ahead of its time, offered seat belts, and you recall that, Mr. Hanna. It scared the hell out of people. Do you remember that? Ford immediately withdrew that entire

advertising series because they were afraid that they had somehow communicated that there was something about that particular vehicle that was more unsafe than other vehicles in the market. How would you respond to that criticism that was made when the industry said safety doesn't sell, thereby implying that if it doesn't sell it is not really a priority with us. I know that was not your testimony this morning, and I want to be very clear that I don't want to be accusatory of you or Mr. Dana, but certainly we have heard that in the past.

Mr. HANNA. Yes. And it has been debated, and I think by people in good will on both sides over the years as to whether or not people were receptive to certain kinds of things. But the world has changed. It is an entirely different circumstance now than it was in 1956 or 1966 or 1976. I think all you have to do is look at the advertising of car companies now. They are advertising widely the capacity that is built into the cars in terms of features and so on and the expectation that people will be receptive, and they do market research and their objective is to sell automobiles and people are receptive to it, so I think you would find a strong consensus in the industry now that the public is interested in safety.

The public wants safety and the public buys safety. And I think that is extraordinarily important because it is driving a lot of what you see going on in the market right now, and I think in the long run it is the best assurance that you have that there is no turning back on this. Once these systems and features and capacities are built into automobiles, it would be probably more difficult to design them out than it was to put them in in the first place, so I think it is a sign of—I am encouraged by it and I think it is a good development.

Senator BRYAN. I think it is certainly fair to say, as you point out, that the climate is much more safety oriented than it was in the 1950's and I think it is also fair to compliment the industry that today's automobile is a lot safer than the automobiles even a decade ago much less than those 35 years ago. How do you respond to this type of question? Assume that a technology is available in a practical sense for safety and yet you do market surveys and nobody seems to respond to it in terms of the public. They don't understand it or they don't place much of a value to it, but the technology is available and it does create a measurable safety improvement. Should the industry go forth and put that into the vehicle even though there is some cost involved?

Mr. HANNA. I will make two responses.

Senator BRYAN. Sure.

Mr. HANNA. One is that each company one at a time has to make that decision because they are competitors in the market, and it is true, if you run your price up with something that people aren't willing to pay for you would not sell your car and you haven't done any good for anybody. But one of the ways you get those devices and technology introduced into the market is offer it as optional equipment, which was done for a time with airbags. Now it is becoming standard equipment. It is being done with antilock brake systems so people will have it made available to them if they wish, and as you develop a body of good experience with this and adver-

tise it and it gets—people get a good perception of it, you find that it sells more and more.

So, I think the companies act very responsibly when they make these devices available as option equipment, and at least one major car manufacturer has indicated, for example, the antilock brake systems will be made available as option equipment within the next two or three years on all of their products, so people have a choice. Nobody is deprived of that option or that feature if they choose to buy.

Senator BRYAN. Mr. Dana, how would you respond to that? Mr. Hanna talked about antilock brakes. I believe it would probably be fair to say that most Americans do not understand antilock brakes, and I am not here to tell you that this chairman fully understands the technology of antilock brakes, but for most folks that is not exactly a household term. It is not the conversation most families generally engage in in the evening around the dinner table.

So, let's just assume for the sake of argument that the knowledge level is far, far less among the American public than it is certainly among those of you who know something about the automobile industry. Assume for the sake of argument, Mr. Dana, that antilock brakes are indeed much safer. The technology clearly exists. Mr. Hanna points out, I think you probably agree, it is being placed on automobiles on a optional basis. What is the policy argument, accepting as a premise, one, that it is technology that is in existence, available; and two, that it makes cars much safer; why should we wait until the American public demands it, recognizing that the American public is not an expert in safety? Why shouldn't manufacturers offer it and include it in all vehicles? I'll throw that one to you, Mr. Dana.

Mr. DANA. If I can digress from your scenario for just a moment——

Senator BRYAN. And if you disagree with the assumption, I welcome that response as well.

Mr. DANA. Let me try to make just a few comments on ABS. As was said earlier, the focus right now is on heavy trucks because there is a disparity in loaded versus unloaded weight and the propensity to skid. It is important to understand that the current braking standard for NHTSA requires vehicles to stop in specified distances without locking the brakes so, in essence, the Federal standard is an antilock standard, if you will. That doesn't mean you have to have antilock brakes.

And I think there are certain misperceptions about antilock brakes. Antilock brakes in general in dry weather may not be that much better than a standard set of brakes on a vehicle, which are very good to begin with. Where they do become important is in adverse weather, wet weather, where they are extremely important. What is probably not appreciated or even understood by those who own vehicles with antilock brakes, is that they allow you to steer through and maneuver while under full braking.

Senator BRYAN. Let me interrupt you, if I may, just so I understand the baseline that we are pursuing. I believe you are saying, if I understand you, that in dry weather they may not, with respect to vehicles the size of automobiles, offer a significant improvement,

but that they can and do make a difference in bad weather, wet weather, icy weather; is that a fair response?

Mr. DANA. That is fair.

Senator BRYAN. OK, go ahead.

Mr. DANA. These braking systems increase your ability to handle the vehicle and maneuver in full braking even on dry pavement, but a driver has to understand this and be able to handle that situation.

It is also important to recognize that there are certain very specific instances where antilock brakes can be a detriment. If you are on a gravel road, what helps stop the car is the buildup of the gravel in front of the wheels when they lock up. If you are braking hard and your antilock brakes are working and preventing that from happening, you may, in fact, go longer on a gravel road, or in some instances in thick snow, so it is important to understand those differences.

Having said that, I will try to answer your question, which is, Should they be withheld from the public or not. I don't think they are being withheld. As Mr. Hanna says, they are being made available fairly rapidly, if not as standard equipment, as a option in many vehicles, and the rationale for that is, again, we are trying to market vehicles to a consuming public which have different needs. Some people basically want a fairly inexpensive low line car, and at least the early versions of antilock brakes are very expensive systems. Being able to offer them as an option really is a benefit, because those who, and, again, not trying to prejudge the public, don't want to purchase them or pay the extra cost, have the ability to do so. But if someone wants to buy the brakes, then they have that option. I think it is important to understand that right now antilock brakes are available in a fairly wide range of vehicles, not just high line vehicles as I think you mentioned earlier.

I know that on some versions of the Nissan Sentra, which is a fairly inexpensive vehicle, antilock brakes are available, so I do think there is a fairly wide range of availability even now, and that will get much broader very quickly.

Senator BRYAN. I think the issue that our colloquy raises, and I am not going to persist on this, is that even with the disclaimer that you make with respect to the gravel road situation, Mr. Dana, it is fair to conclude that you are saying that antilock brakes on balance provide overall safety improvement, notwithstanding the existing braking standard that is in existence. If it does, and you talk about the various needs of various motorists, I would think safety would be a factor for every person who drives. I think one can fairly say that, when breakthroughs like this occur and the technology becomes practical, that you may take a while sometimes to check things out, but at that point not to make them available to all, I mean I think does raise a philosophical question. You are saying, let the market forces work themselves out and eventually over the period of years your view and I think Mr. Dana's view is that airbags will go into cars and I suspect that is probably true. In the meantime there are a lot of people who are going to lose their life, a lot of people are going to suffer injury when that technology is in existence and available. How do you rationalize that?

I guess that is really the question, and not just with respect to antilock brakes or airbags.

Admittedly, some things speculative are out there, and reasonable people can disagree as to whether they do improve safety. But airbags are things I think we clearly developed in our hearings on S. 591 that we all agree on, and antilock brakes, it appears there is consensus that on balance in bad weather and inclement conditions are improvements. How do we reconcile that?

Mr. DANA. I think it is important to point, out at least on the airbag issue, as we both talked to you a few weeks ago that, in fact, manufacturers are incorporating airbags as rapidly as possible. You have to remember that in the industry there are fairly long leadtimes in terms of production.

Senator BRYAN. Sure.

Mr. DANA. So, when I came before you 2 weeks ago and said I expect virtually all manufacturers that I represent to have full frontal airbags by the 1994 model year, that represents a decision that has already been made and put into a production plan. It is done, because manufacturers have already locked in designs and plans for 1993 and virtually locked them for 1994. I guess this sensitivity is not well understood many times, that auto manufacturing is a very long leadtime production process. So, when we talk about the next few calendar years, that is essentially done. It is a commitment.

Senator BRYAN. I think most of us that try to be fair in terms of hearing the testimony recognize that there is a leadtime. Let me just ask, Mr. Dana, from the standpoint of implementation—forget for the moment rules and regulations—what is a reasonable leadtime for every manufacturer volitionally to implement airbags? What would be a model year that——

Mr. DANA. Generally speaking when you look at requirements placed on the industry, we talk about the need for 4 years leadtime because we are generally that far ahead in terms of locking in design. That is sort of a rule of thumb, if you will. Obviously things can vary when they are much more complex. If there is clear consumer pressure, which we feel there is on airbags, people will probably stay up overnight to try to get it done quicker if they can, and I think that is what happens.

Senator BRYAN. And that would be model year 1996, would it not? You are talking about a vehicle that enters the market in 1995 under the timeframe as of today, that would be model year 1996.

Mr. DANA. September 1995 is model year 1996.

Senator BRYAN. Mr. Hanna, is Mr. Dana right from your perspective?

Mr. HANNA. Yes, I think generally, and I think we testified to that last time—the last time that that is our expectation, that virtually all of them would be done by that time in that time period. Certainly that is what is the car companies have indicated that they are going to do.

You raise the question philosophically as why not—there are some of us who don't think it is necessary to pass a law to tell us to do what we are already doing, and I think I raised some specific instances at that last time that if you codify this into the statute, then if you have some interruption of supply or component, that

means you have to pull that car off the road or on a production, unless there is another act of Congress. There are all sorts of problems with that.

I don't see a conflict here at all on the matter of airbags or antilock braking either. They are coming rapidly. They are going to be implementing airbags as rapidly as would the draft legislation have called for. I think something on that same record order is going to be with antilock brake systems, and to mandate it across the board, you know, there are economic considerations in this. Mr. Dana has alluded to them. It is awfully important to offer reliable, safe transportation at prices people can afford. There are some things that are awfully expensive, and I am not trying to dump on airbags or antilock brakes, but it would be possible to encumber an automobile with expenses such that ordinary people wouldn't be able to afford to buy it. What would happen is they would be driving older used transportation and forego the opportunity to have a new, cleaner, safer automobile, and I really think the car companies are working expeditiously on these major things, and I think they are making a good faith effort, Mr. Chairman.

Senator BRYAN. Well, without impugning anybody's good faith, I think the point that is made, and we will conclude on this note, is that you have to acknowledge that there have been some safety developments, some stop and go attitudes on the part of the industry where something has been-pursued and then relegated to a lower priority. There are some assurances about airbags and indeed what you believe will occur, the full implementation, Mr. Dana says probably by model year 1996 and you may or may not agree with that estimate.

It just seems to me it makes sense even from a competitive point of view, to have everybody, in effect, required to adhere to the same safety standard for that model year, whatever it happens to be. Would you concede that nobody is obligated to meet that projection, even though they are talking about doing that? Maybe some manufacturers, either your group or Mr. Dana's group, may say, "Look, we think we are not going to do that. We think we can sell the car so much cheaper without the airbag and that is going to be a sales advantage"?

Mr. DANA. I think, Mr. Chairman, maybe you underestimate the pressure we feel from consumers. I mean, again, marketing is what sells cars, and meeting the market demand is what is important here. I think it is important to recognize that—in my view—in the last few years we seen a revolution in terms of consumer wants for safety, and as we have both stated to you, we think safety sells, and there is a tremendous pressure on us to get safety improvements into the marketplace. I think any manufacturer who continues to try to offer a vehicle in the outyears from now without an airbag is going to find himself at a severe competitive disadvantage.

Senator BRYAN. And you may very well be right on that, Mr. Dana. I think it does raise a question, though. Unless it is something that is a sales advantage, there may not be the pressure to put it into a vehicle. However, a lot of people would come from the perspective that if it is a safety technology improvement of some measurable degree, as airbags, we all agree are even though there

may not be the sales pressure, we ought to at least make them available. I think there is a philosophical difference that one can argue about.

Mr. Hanna, you had a comment.

Mr. HANNA. I was only to say that there is a administrative agency in place to look after matters like that, and while they have been very forthcoming and willing to talk about things, they have also been very stern and very aggressive in rulemaking, and I think if there are any backsliding, that is what that agency is there for. I think it is more than a voluntary effort, and again I don't mean to belabor or the point.

Senator BRYAN. We always appreciate your comments and testimony, Mr. Hanna, Mr. Dana, thank you very much for joining us this morning. We appreciate that.

Our concluding panel this morning will be Ms. Eleanor Chelimsky, who is the Assistant Comptroller General for the General Accounting Office; Mr. Brian O'Neill, President, Insurance Institute for Highway Safety; and Prof. J. Daniel Khazzoom, Professor of Quantitative Studies, San Jose State University.

I would like to welcome you to the subcommittee hearing and indicate that each of you has submitted your testimony in advance and it is made a part of the record, and we will defer now first to Ms. Chelimsky. It looks like you have some graphs or charts. Why don't you share with us what you have got.

STATEMENT OF ELEANOR CHELIMSKY, ASSISTANT COMPTROLLER GENERAL, GENERAL ACCOUNTING OFFICE

Ms. CHELIMSKY. Yes, thank you, sir. It is a pleasure to be here to tell you about the work we are doing in GAO on the relationship of automobile weight and safety. Like a lot of work that our division does for the Congress, the current study involves questioning some rather hallowed assumptions and looking very closely at the research and data that have been presented to support those assumptions. We haven't finished our work yet. But we already have some preliminary findings that we are happy to share with you.

Let's look at our first chart. What it shows is that, over the 12-year period between 1976 and 1988, car passenger fatality rates have been declining at the same time that passenger cars themselves have been slimming down. Now, these data do not, of course, suggest that lighter cars lowered the fatality rates, but they do make it harder to argue, as so many have done, that downsizing necessarily increases fatalities.

Second, let's look at fatalities in single-car accidents in terms of the automobile weight involved. In the next chart notice that there are six weight categories in this chart that move horizontally, going from the lightest cars on the left to the heaviest ones on the right. Well, you can immediately see that the highest rate of fatalities occurs for middle size cars, not for the smallest ones.

Now, this clearly runs contrary to the conventional wisdom that occupants of the lightest cars run the highest risk of fatality. If weight has something to do with fatality risk, it is certainly not the only factor. If it were you'd expect to see a very different curve without any blip for middle size cars. On the other hand, it is also the case that the heaviest cars are the most protective of their own

passengers. If you look at rollover trend, that is the black line at the bottom of the chart, you can see they have only one-third as high a fatality rate as the other cars do.

Our third finding is that the protection the largest cars do offer their own passengers is not necessarily a benediction for passengers in other cars. Our last chart, which shows two-car accidents, has two contrary curves. The black line shows a general decrease in fatalities to car passengers as the weight in the car in which they are traveling is increased, but the dashed line shows that passengers are unambiguously better off if their car is hit by a small car. The heaviest cars create the greatest fatality risk to others. This is an important point for policy, which is concerned not just for the safety of particular individuals in particular cars, but with the risks run by all passengers.

In summary, GAO disagrees with the notion that lighter cars are inherently less safe than heavier cars. What we find is that lighter cars are safer for their passengers than middle size cars, they are less safe than the heaviest cars, and they present the least risk of any car as an impacting force.

We also question the data support for the often-heard statement that each year 1,300 additional fatalities in single-car rollovers have been caused by downsizing to lighter weight cars. Instead, what the data do show is that fatalities in single-car rollovers are related to a variety of factors like length and weight, and chief among these is not car weight but rather track width.

What are the implications of these findings? First, it is clear that heavier cars are not safer for everyone, only for their own passengers; they actually increase the risk to others. Second, middle size cars have higher fatality risks than small cars. Their increased weight doesn't appear to have helped their safety performance. Finally, because of the impact risk created by heavier cars, we believe that if the percentage of small cars on the road were to increase the overall fatality rate in two-car accidents might decline.

That concludes my remarks. I would be happy to answer any questions.

[The prepared statement of Ms. Chelimsky follows:]

PREPARED STATEMENT OF ELEANOR CHELIMSKY

Good morning, Mr. Chairman and Members of the Subcommittee:

The GAO is pleased to respond to your invitation to testify this morning about the work we are doing concerning the relationship between automobile size and safety. While our investigation of this subject is still in progress, I believe we have reached some important preliminary conclusions that will help to shed some light on the current debate. I would like to share these with you this morning.

My primary message to you today is that this issue is not as straightforward as it may appear at first glance: there is not a simple linear relationship between automobile size and occupant safety. Car size must be thought of from the viewpoints of both protection and risk. That is, the safety provided to the occupants of a large car must be considered together with the risk posed by that same car to passengers in other automobiles. In addition, car size has different effects in different types of accidents.

Our major conclusion is that it is not true that cars become more dangerous simply by getting lighter. The highest fatality rates occur in cars in the middle of the weight spectrum, particularly in single-car crashes. In two-car collisions, the occupants of the lighter car are at greater risk than the occupants of the heavier vehicle. However, our analysis suggests that if all cars became lighter, the increased vulnerability of lighter cars in two-car crashes would be more than offset—all things being equal—by the reduced threat to them from heavier cars.

Let me begin by recognizing the professional and timely assistance that we have received from the National Highway Traffic Safety Administration. NHTSA has given us access to the data sets we need for our work and has provided extremely competent technical assistance in the use of those data sets. Also, we look forward to reading NHTSA's forthcoming report on the effects of vehicle weight in multi-vehicle accidents that is, I understand, to be released quite soon.

GAO undertook this work because of the heightened attention given to the safety aspects of small cars stemming from 5. 279 and other recent proposals to dramatically increase corporate average fuel economy (CAFE) standards. As you know, it has been argued that stricter fuel efficiency standards can only be achieved—at least in the short term—if automobile manufacturers build and sell lighter cars than they do now. And it is further claimed that lighter cars are inherently less safe than heavier cars. Indeed, in prior testimony to this subcommittee, it has been stated that "over 1300 fatalities" annually can be attributed to the downsizing of America's automobile fleet during the 1970s.

We will not address the question today of whether it is true that more stringent CAFE standards can only be achieved by building lighter cars. Nor can we speak to automobile design features that may make cars safer in the future. Instead our work to date has been directed specifically at testing the contention that lighter cars are more dangerous.

BACKGROUND

Two potential sources of ambiguity exist in this area. One concerns the car weight and safety relationship. There are at least three different ways that car weight can affect occupant safety. The first relates to stability, or the propensity to roll over. Some analysts maintain that lighter automobiles cause more occupant injuries and deaths because they are less stable than heavier cars, and thus roll over more easily. The second effect of size is the one that comes most easily to mind: occupant protection, or crashworthiness. It is clear that heavier automobiles offer more protection to their occupants in the event of a collision than do lighter cars. The third effect of size is as a force initiator that acts in much the same way as a weapon. Heavier cars subject their own occupants to more force at a given velocity than do smaller automobiles when they hit a fixed object. Just as importantly, in the case of multi-car collisions, they impact the other vehicles with more force than would a smaller car. For example, a 2000 pound car needs to achieve a speed of 46 miles per hour in order to generate as much force at impact as a 3500 pound automobile traveling 35 miles per hour.

The second possible ambiguity stems from the imprecise use of terms like "downsizing" or "car size." For our purposes here, car size refers only to car weight, not to length and width or other possible measures of size. Weight is the aspect of automobile size that is the most closely related to fuel efficiency.

For our data analyses, we asked NHTSA to make available to us the data from their Fatal Accident Reporting System (FARS)—which contains details of every highway fatality since 1975—together with information on the types of cars registered each year since then. From these data we developed fatality rates for different weight categories of passenger cars and different types of accidents. Fatality rate is defined here as the number of persons killed in a given category of passenger car for every 100,000 of those vehicles registered.

This said, let me move to a more detailed discussion of our work to date.

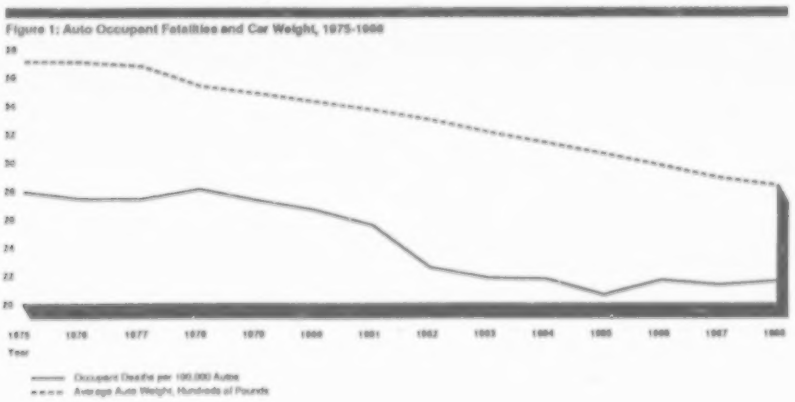
PRELIMINARY FINDINGS

As you can see from Figure 1, there are two clear historical trends since the mid-1970s: highway fatality rates have decreased at the same time that the mean weight of cars has become smaller. The solid line on the graph shows that the fatality rate for passenger car occupants decreased from approximately 28 deaths per 100,000 registered autos in 1975 to roughly 22 per 100,000 registrations in 1988. Since 1988, highway fatality rates have continued to decline. And on average, as the dashed line illustrates, cars on the road in the late 1980s weighed about 800 pounds less than cars on the road in 1975. No one should conclude from these trends that the move toward lighter cars has actually saved lives, but these trends do make it more difficult to support the case that car weight reductions have increased fatalities.

SINGLE-CAR ACCIDENTS

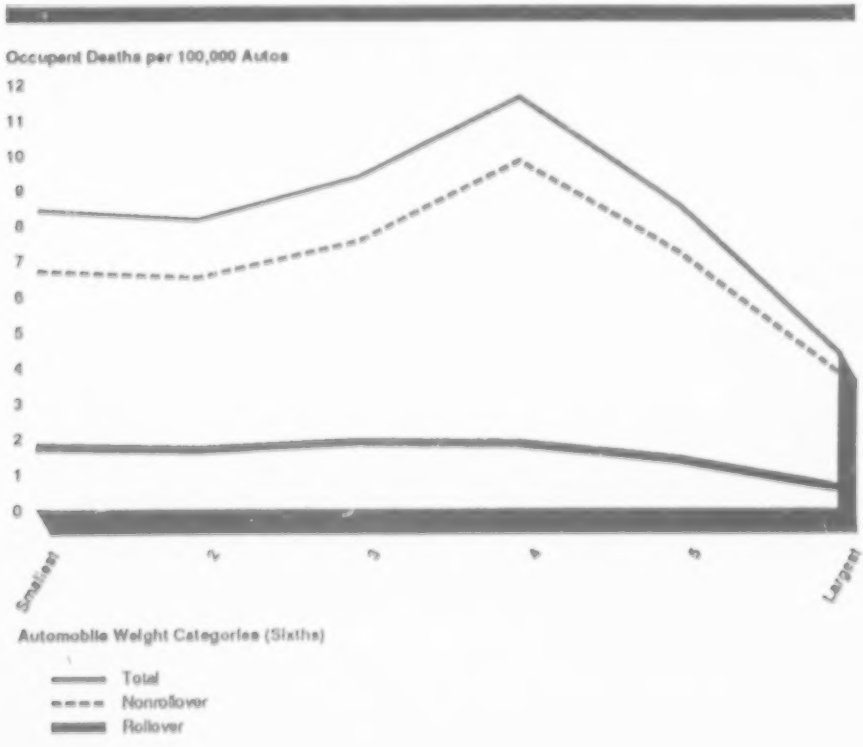
We first examined single vehicle accidents. We restricted our analysis to one to two-year old passenger cars involved in fatal accidents from 1986 to 1988, the latest year for which data were readily available to us. Single car accidents accounted for

39 percent of the fatalities in these automobiles (51 percent were in two-vehicle crashes and 10 percent in accidents with three or more vehicles).



The weight categories on Figure 2 delineate six equal-sized divisions of the population distribution of car weights (i.e., the number of cars in each category is roughly equal), with the smallest cars in the weight category to the extreme left, the next smallest group just to the right of that, and so on to the weight category with the largest cars on the far right. The top line on the graph charts the overall fatality rate for single car accidents, while the other two lines represent subsets of the total: the lower line for rollover accidents, and the middle line for nonrollover accidents.

Figure 2: Deaths in One Car Accidents



As you can see, fatality rates do not appear to be a simple linear function of car weight. The lowest fatality rates do occur in the largest car category, but the highest fatality rates occur in cars in the fourth weight category, not in the smallest weight

group. The pattern is the same for nonrollover crashes, with the highest fatality rate again in the fourth category. For rollover crashes, the fatality rate in the four smallest weight categories is approximately equal, while the heaviest cars have a much lower fatality rate, only about one-third that of the other categories. Less than 20 percent of the fatalities in single car accidents occur in rollover crashes.

Within this context, let us return to the statistic we cited earlier, that "over 1300 fatalities" annually are due to automobile downsizing. This estimate refers only to single vehicle, rollover crashes. The statistic was drawn from a study that modeled the effects of several design and policy changes during the 1970s on car safety, in particular on the propensity of vehicles to roll over. What the study found is that the relationship among all the changes to vehicles during the 1970-82 period is very complex, and that several factors appear to be related to rollover propensity. According to the model which best fits the data, car weight is one of these factors, but not the most important. To quote the study: "the model shows that rollover propensity decreases as cars get wider, heavier, and longer. Track width, however, has by far the highest correlation. For a typical car with a track width of 55 inches, curb weight of 3000 pounds and wheelbase of 105 inches, a 1 percent increase in track width is associated with a 5 percent decrease in rollover propensity. A 1 percent increase in curb weight is associated with a 0.6 percent decrease in rollover propensity.[1]

The logical conclusion from this analysis is not that a given number of fatalities can be associated with changes in the weight of cars, but that track width is a critical factor affecting rollovers. First, if we accept the validity of this NHTSA model, manufacturers could offset the increased rollover propensity associated with making a car 150 pounds lighter by increasing its track width one-third of an inch. Second, we would like to make a cautionary point about the use of such models, a point that has been well-stated by NHTSA: "While the methods of this report are appropriate for estimating the effect of historical changes in car size on rollover fatality risk, it would be inadvisable to use them to predict what might happen in the future if a single parameter (say, curb weight) is changed while others are held constant.[2] While no one has predicted in so many words that 1300 more deaths will occur in the future if cars become lighter, still, calling attention to that estimate in a discussion of prospective changes to the future automobile fleet could lead others to misinterpret NHTSA's findings.

TWO-CAR ACCIDENTS

We turn now to two-vehicle accidents. We restricted our analysis here to accidents between two passenger cars, in order to simplify the task of examining the interactive effects of the weights of both involved vehicles. We also were able to look only at accidents involving the cars in our sample and other cars that were less than 10 years old, because we did not have valid data about the weight of older vehicles. Two-car collisions accounted for approximately 54 percent of all two-vehicle accidents for our 1986-1988 sample.

The solid line on Figure 3 describes the effects of car size in the second meaning we described earlier, as occupant protection. As you can see, occupant fatality rates do generally decline as weight increases, with the largest cars providing the most protection. However, once again, the smallest cars are not the most dangerous; the cars with the highest occupant fatality rates occupy intermediate positions in the weight distribution.

To this picture, the dashed line on the chart adds the effects of car-size in its third role, as an initiator of force. It shows the death rate for occupants of the "other" car in each accident; that is, for the vehicles that receive the force conveyed by different sized cars. Not surprisingly, there is a clear effect of automobile weight—the number of "other" vehicle fatalities increases as the weight of one's own car gets larger. In this perspective, the smallest cars are the safest for the occupants of other vehicles, while the largest cars are the most dangerous.

Taken together, these findings have two implications. The first is straightforward: in accidents involving two cars, occupants of the heavier car are safer than those in the lighter automobile. Second, the comparatively small amount of force that light cars generate when they impact another vehicle means that the overall fatality rate in two-car accidents may actually decrease slightly if the percentage of small cars in the population is increased. Indeed, we estimate that the overall number of fatali-

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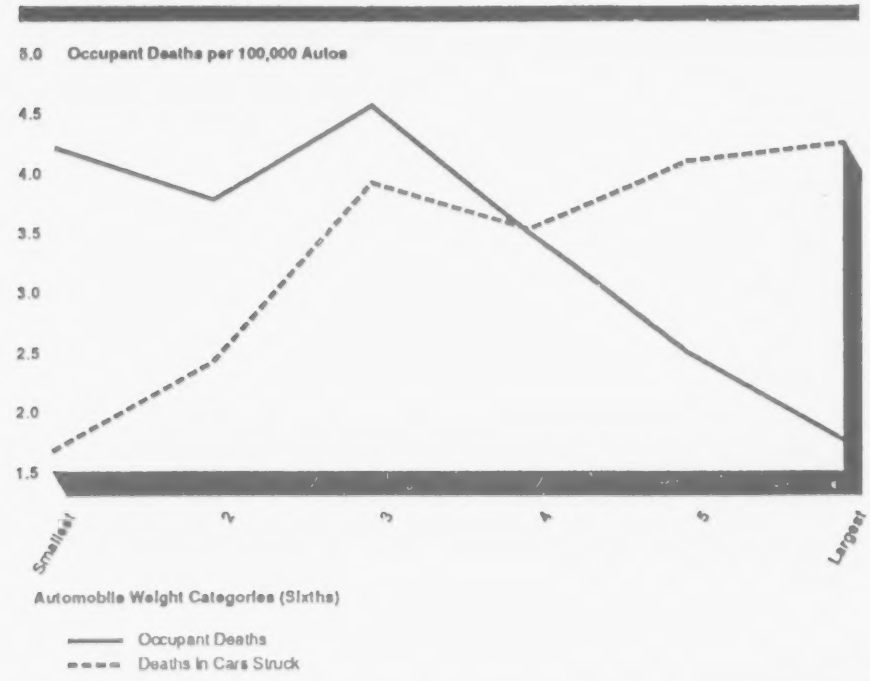
[1] Kahane, Charles J. *An Evaluation of Door Locks and Roof Crush Resistance of Passenger Cars—Federal Motor Vehicle Safety Standards 206 and 216. Report DOT HS 807 489.* Washington, D.C.: National Highway Traffic Safety Administration, 1989, p. 111.

[2] Kahane, Charles J. *Effect of Car Size on Fatality and Injury Risk in Single Vehicle Crashes.* Washington, D.C.: National Highway Traffic Safety Administration, 1990, p. 13.

ties in two-car accidents for our 1986-1988 data set would have been approximately 5 percent lower if the percentage of all cars in the two smallest weight categories (below 2420 pounds in our definition) had been 50 percent greater, all other factors remaining the same. This is because the percentage of relatively deadly accidents between large and small cars would have decreased, while the percentage of somewhat less injurious accidents between two small cars would have been larger.

Figure 3: Deaths in Two Car Accidents



This difference in perspective is an important one for policy. From the standpoint of an individual traveling in an auto that is involved in a two-car collision, it is safer to be in the heavier car. However, from the perspective of all passenger car occupants collectively, it is the overall fatality rate in two-car accidents that needs to be considered, and that rate could be at least somewhat reduced if the percentage of small cars on the road were increased.

PRELIMINARY CONCLUSIONS

In summary, the relationship between car size and safety is not a simple one. We found that heavier cars are not invariably safer than lighter ones; indeed, the highest fatality rates are in cars in the middle of the weight distribution. When two cars of different masses collide, the smaller car is likely to sustain more damage than the larger one. However, we estimate that if the proportion of small cars on the road were to grow substantially, the total fatality rate in two-car accidents would decline slightly due to the decreased likelihood of comparatively deadly collisions between large and small cars.

FUTURE RESEARCH

As we stated at the beginning, our work is not yet complete. Over the next few months, we plan to analyze data from state accident data bases in order to look at nonfatal injuries and to investigate how different driver characteristics affect safety. We also plan to take a comprehensive look at automobile characteristics other than weight (e.g., engine capacity, wheelbase, and cost) that may be related to car size, fuel efficiency, and safety.

This concludes my remarks, Mr. Chairman. I would be happy to answer any questions that you or Members of the Subcommittee may have.

Senator BRYAN. Thank you very much, Ms. Chelimsky.

Mr. O'Neill, it is always a pleasure to have you back before the committee again.

STATEMENT OF BRIAN O'NEILL, INSURANCE INSTITUTE FOR HIGHWAY SAFETY, ARLINGTON, VA

Mr. O'NEILL. Senator, I would like to quickly touch on some rulemaking issues. I would ask that my complete testimony be put in the record.

Senator BRYAN. It will be made a part of the record as well as that of each of you who are here.

Mr. O'NEILL. I think there is no question that the present administrator of NHTSA has done a good job of cleaning up rules that have been building up and gathering dust under the previous administration. There are still things to be done in that cleanup. As we know, we still haven't got a final rule for side-impact protection for light trucks, not even the old side-impact requirement let alone a dynamic requirement, but clearly the agency has been doing a good job of cleaning up the backlog.

It is not doing such a good job, I think, in moving forward on areas that urgently need attention. They have finally issued a rule to upgrade side impact protection for thoracic injuries, but we still haven't addressed the very serious problem of head injuries in side impacts, and clearly there is an urgent need for that rulemaking and the research to support that rulemaking to move forward, as well as an urgent need to quickly evaluate the alternative side-impact and alternative injury criteria that have been part of the problem with the previous rule.

And I would certainly agree with some of the earlier witnesses that part of the problem within the agency is lack of funding. Their research funds are inadequate for their mission; they are inadequate for the problem they are dealing with, and we clearly need in this country more money for funding research in this area.

We have heard a little bit today about antilock brakes. Clearly there is an urgent need for rulemaking for antilock brakes for big trucks. These are the vehicles on which we need antilock brakes most urgently, and they are given the current marketplace scenario, the ones that are going to get antilock brakes last. The technology is available, and it works. They are required in a number of other countries. We are still messing around trying to figure out whether or not we should require them, and we are falling behind the rest of the world. We have nearly 5,000 people killed in crashes involving large trucks. The overwhelming bulk of those people are people who are sharing the road with the large trucks, and antilock brakes promise to eliminate jackknife crashes, which not only cause deaths and injuries, they cause traffic jams and all sorts of problems around the country.

I am delighted to hear from the administrator that NHTSA will take another look at the bumper standard. That was an inadequate analysis, although they keep referring back to it it never was valid, and I am delighted that they are finally agreeing they will take another look at it.

We need action on daytime running lights. There is a pending petition from General Motors to issue a rule that would permit the use of daytime running lights. Daytime running lights have been

shown to be effective in reducing daytime two-vehicle crashes in Scandinavia and in Canada. In the United States right now they are not permitted because of some odd State laws that have the affect of precluding their use. NHTSA could simply preempt these by issuing a permissive rule.

We need action, rulemaking action, on child booster seats. These are the seats for the children who have outgrown the traditional child restraint but are still too small to get a good safe fit in a regular adult seat belt. And, yes, we do need some work on pedestrian rulemaking.

I would like to finish with a few words on car size. Since my organization is part of the conventional wisdom, I will make a statement, sir. Everything else being equal, bigger is definitely safer when it comes to occupant protection. Research dating back to the 1960's by organizations like NHTSA, the Highway Safety Research Center of the University of North Carolina, the Highway Research Institute of the University of Michigan, Harvard University, Brookings, General Motors, New York Department of Motor Vehicles, and the Insurance Institute for Highway Safety, plus others have shown this.

But let's be clear on what we are talking about. Some studies consider weight and size interchangeably, but, in fact, exterior vehicle size is the important factor and the one we should focus on, not as some people are doing, interior volume. The Center for Auto Safety study that was referred to this morning, to give an example, has classified vehicles in that study based on their interior volume. They give an example of a typical subcompact, the Honda Civic which has a wheelbase of 98 inches, and the typical midsize car in their study is a Ford Escort with a wheelbase of 94 inches.

If you talk about exterior dimensions, the Escort is smaller than the Civic. Yet when you use interior volume as a definition of size, the smaller car exterior becomes a midsize car and the larger car becomes a subcompact.

There have also been claims that the fleet has not gotten any smaller. Again, most of those claims are based upon interior volumes not exterior dimensions. Just to give an example, in the 1975 model year, 42 percent of the cars sold had wheelbases of greater than 114 inches. In the 1988 model year, only 5 percent of the cars had wheelbases greater than 114 inches. So, the safety community believes that exterior dimensions are important, not interior volumes. And it is true that both size and weight can influence occupant safety, but as we just heard, weight has tradeoffs in terms of safety.

In crashes between two vehicles, weight protects the people in the heavy vehicle by increasing the forces transmitted to the occupants of the lighter vehicle. Car size, on the other hand, protects people in single- as well as multiple-vehicle crashes without imposing penalties on the occupants of other cars in the multiple vehicle crashes.

Now, I've only just seen these GAO findings, and I know they are based on weight, but I would urge GAO to pay attention to the body style of the vehicles involved, because some of those excess deaths in the midsize range are, unfortunately, related to high per-

formance vehicles or performance vehicles such as Camaros and Firebirds that have very high death rates.

Certainly size is not the only factor. Performance and other factors also influence the protective capability or the death rate of the vehicles. The distinction, however, between vehicle size and vehicle weight when it comes to safety, we believe, is important because it means that safety doesn't necessarily have to be at odds with fuel economy. There are two basic ways to get more miles per gallon of gas. One is to improve automobile technology so cars burn fuel more efficiently, and the other is to reduce weight so that less fuel is needed to move the vehicle. There are, in turn, two basic ways to reduce car weight; one is to use lighter materials when manufacturing the car, and the other is to make the car smaller. It is only when cars are made smaller because of fuel economy that those goals come into conflict with safety. Thank you, Senator.

[The prepared statement of Mr. O'Neill follows:]

PREPARED STATEMENT OF BRIAN O'NEILL

The Insurance Institute for Highway Safety is a nonprofit research and communications organization, supported by the nation's property and casualty insurers, that Identifies ways to reduce motor vehicle crashes and crash losses. I'm the Institute's vice president and, at this subcommittee's request, I'm submitting for the record comments on important motor vehicle safety issues now before the National Highway Traffic Safety Administration.

VANS, PICKUP TRUCKS, AND UTILITY VEHICLES

Light trucks and multipurpose passenger vehicles have been popular means of transportation for years, but only now are they being required to meet several important safety standards that apply to passenger cars. Beginning in September of this year, for example, such vehicles must be equipped with head restraints and lap/shoulder belts in rear seats. Phase-in of the automatic restraint requirements that apply to passenger cars will begin with 1995 models.

Important as these steps are, there's more to finish. Rulemaking begun In 1989 would improve roof crush resistance for vans, pickup trucks, and utility vehicles. But, as yet, there's no final rule. The same is true for high center-mounted stop lights and increased side impact protection—rules have been proposed but no final standards have been forthcoming. These rules should be issued as soon as possible. Vans, pickup trucks, and utility vehicles are being used, in most cases, just like passenger cars, and they ought to meet the same safety standards across the board as soon as possible. Manufacturers are expecting such rules, so further delay serves no purpose at all.

DYNAMIC SIDE IMPACT REQUIREMENTS

Last year, the National Highway Traffic Safety Administration upgraded the side impact protection standard for passenger cars. Dynamic testing with instrumented dummies will be required starting with 1994 models, and this upgrade should lead to improved thoracic and pelvic protection. The new standard is an important first step, but it doesn't address the whole side Impact protection problem. According to the agency's own estimates, nearly half of all deaths in side impacts involve head injuries, so we urgently need a standard to reduce these, too.

A new Insurance Institute for Highway Safety study confirms the importance of reducing head injuries in side impacts. Based on study of more than 140 deaths in such crashes, researchers found more head and chest injuries than any other kind. Motorists not seated on the side of the vehicle that was struck had more head injuries than those seated on the struck side, and the vehicle Interior was the source of most occupant head injuries. The researchers concluded that 44 percent of the 140 deaths In side impacts could have been prevented using existing occupant protection technology. Strengthening the side structures of cars and putting in more padding are the most common ways that could be used to reduce deaths in these crashes.

The National Highway Traffic Safety Administration shouldn't stop now that it has addressed thoracic and pelvic injuries in side impacts. It should move to address

head injuries in such crashes in the very near future. And it should quickly evaluate the BIOSID dummy and alternative injury criteria.

ANTILOCK BRAKES ON TRUCKS

Trucks have poor brakes compared with passenger cars. On dry surfaces, they take much farther to stop—47 percent farther in insurance institute for Highway Safety tests. On wet and slippery roads, the disparity is even worse. This problem of inferior truck brakes on wet roads is aggravated by their greater potential for loss of control and jackknifing. Antilock brakes not only reduce stopping distances on wet and slippery roads but also help drivers maintain control. Yet the vehicles on U.S. roads that, in increasing numbers, are being equipped with antilock brakes are passenger cars—not big trucks.

The history of trying to get antilock brakes on tractor-trailer rigs Is a lengthy on-again, off again story (see attached Status Report, Vol. 25, No. 5). In brief, the National Highway Traffic Safety Administration began in 1969 by proposing stopping distance plus steering control and stability requirements for big trucks in sudden stops. These proposals would have allowed only momentary wheel lockup while stopping. A federal truck brake standard took effect in 1975, but its antilock and stopping distance requirements were suspended in 1978 as a result of litigation and now, 13 years later, no such requirements are in effect.

The antilock brake technology that would improve truck and trailer braking and stability has been extensively tested, both on the test track and on the road. Common Market countries have required all intercity buses weighing more than 12 metric tons plus trucks and trailers weighing more than 10 tons to be equipped with antilocks since October 1,1990. Similar regulations will take effect In Japan in October 1991. But the United States is lagging behind other countries. The federal government doesn't require antilocks on big trucks and has no plans to do so. it's time to turn this policy around and start fast-track rulemaking that will lead to antilock brakes for new trucks and other large commercial vehicles.

AUTOMOBILE BUMPERS

Ever since the National Highway Traffic Safety Administration rolled back bumper requirements from 5 to 2.5 miles an hour, consumers have paid the cost of unnecessarily expensive fender-bender crashes—and paid and paid and paid, as the insurance Institute for Highway Safety's latest series of low-speed crash test results illustrates. Among 22 midsize four-door cars, all 1991 models, the 6 worst sustained more than $3,000 damage in tests at 5 miles an hour. Only 2 cars among the 22 tested had damage totals under $1,000 (see attached Status Report, Vol. 26, No. 2). Thirteen of the 22 models were largely unchanged since the institute tested them in 1987, but the bumper performance of 12 of the 13 had deteriorated.

The fact is that car bumpers can be designed to prevent most damage in low-speed crashes. The 1981 Ford Escort's bumpers did so. They withstood front- and rear-into-flat-barrier crash tests at 5 miles an hour with no damage at all. Even more impressive is that the '81 Escort withstood two more demanding tests at the same speed without any damage. Yet automakers have failed for nearly a decade to follow the Escort's example. in many cases, they have designed bumpers seemingly to assure that damage occurs in low-speed impacts. Some cars perform much better than others but, in general, automobile bumpers allow hundreds and even thousands of dollars worth of unnecessary damage in fender-bender crashes.

Having rolled back federal bumper requirements nearly a decade ago, the National Highway Traffic Safety Administration is also failing to at least provide the information necessary for consumers to tell which cars have better bumpers than others. It's not for lack of Congressional Interest that such information is nonexistent. More than 18 years ago, Congress passed the Motor Vehicle information and Cost Savings Act that required the National Highway Traffic Safety Administration to provide information about bumper performance. But no such information has been forthcoming. Asking the agency to do what Congress told It to do so long ago has become perennial. in the meantime, the insurance institute for Highway Safety's low-speed crash test results serve as virtually the only source of objective information about bumper performance.

DAYTIME RUNNING LIGHTS

Daytime running lights turn on automatically when vehicles are started and serve as an inexpensive way of reducing multiple-vehicle crashes during daylight hours. A fleet study concluded during the mid 1 980s by the insurance institute for Highway Safety involved more than 2,000 passenger cars, vans, and pickup trucks. Researchers found that the overall proportion of daytime multiple-vehicle crashes was

7 percent lower among vehicles with daytime running lights than among a control group of vehicles without such lights.

A 1985 petition to the National Highway Traffic Safety Administration asked for an amendment to the existing lighting standard to permit optional use of daytime running lights. This insurance Institute for Highway Safety petition was granted and rulemaking was begun. But then the agency decided not to issue a rule after all, saying there was no safety need that would justify preempting state laws restricting the use of daytime running lights. Since then, a requirement for such lights has taken effect for new cars as well as trucks, vans, and utility vehicles in Canada. And another petition to allow daytime running lights on cars in the United States—this time from General Motors—has been submitted. The agency should move forward rapidly on this rulemaking to permit the use of such an effective crash avoidance feature, especially because some car manufacturers are now willing to provide them if permitted.

CHILD BOOSTER SEATS

It's important for infants to ride restrained the very first time they're put in an automobile usually on the way home from the hospital—and on ail subsequent trips. Special infant and child carriers serve this purpose, when they're used, and serve it well. But as children get older, they have to make the transition to lap/shoulder safety belts. Then fit becomes a problem, especially the fit of the lap belt.

The lap portion of a safety belt should be positioned low, below the top of the pelvis, so that crash forces will be exerted on a motorist's strong pelvic bone instead of the soft tissue of the abdomen. The problem is that children are seemingly all soft abdomen and no hips, so it's hard to position the lap belt correctly. Plus, the same vehicle design features that conveniently raise belt buckles from seat cushions so they don't get buried also make it hard to keep the belts low on children's hips.

Booster seats can help by raising children up and ensuring that the lap belt is positioned across the pelvis. Such seats also help position shoulder belts across children's chests instead of their necks or faces. But booster seats designed to be used with lap/shoulder belts aren't readily available. Only a few manufacturers sell them in the United States.

The kind of booster seat most widely found here uses a short shield as the primary or, in some cases, the only means of restraint. The lap belt is used to secure the seat to the vehicle, and manufacturers often recommend placing the shoulder belt behind the child's back. Such devices might raise the potential for abdominal injury, but applicable federal safety standards don't include injury criteria or test procedures for measuring abdominal injury potential. This is a shortcoming the National Highway Traffic Safety Administration should address.

CAR SIZE

What research showed to be true as early as the 1960s is still true today—crash Injury and death rates are higher in smaller cars than in larger ones. Overall, the death rate in the smallest cars on the road is more than double the rate in the largest cars. For every 10,000 registered cars 1-3 years old In 1989, 3.0 deaths occurred in the smallest cars compared with 1.3 In the largest cars. The death rate is at least twice as high in small cars, compared with large cars, in both single- and multiple-vehicle crashes. Such effects of car size hold regardless of driver age.

These facts are especially important because, with fuel economy requirements at the forefront of national attention, policies are being considered that might well result in a smaller vehicle fleet. What are the safety consequences of downsizing? Insurance institute for Highway Safety researchers looked at occupant death rates for 11 General Motors car types that were downsized during the late 1970s and 1980s, finding occupant death rates higher for 10 of the 11 types after downsizing. The rate for the eleventh type remained the same. The number of deaths per 10,000 registered Chevrolet Camaros and Firebirds, for example, jumped 43 percent from before to after downsizing in 1982. Deaths per 10,000 registered Buick LeSabres and Oldsmobile Delta 88s increased 27 percent after downsizing in 1986. What's clear from these and other comparisons is that downsized models have more occupant deaths per registered car than their larger counterpart models.

This analysis has been criticized on grounds that downsized cars are newer than their larger predecessor models and that, on average, newer cars travel more miles than older ones—hence, they're more likely to be In crashes. in fact, there are other effects that offset these mileage differences. Newer cars do travel more miles, on average, than older ones, and so there is greater exposure to crash involvement In newer cars. As cars age, the risk of being in a crash decreases. On the other hand,

safety belt use is higher In new cars than it is in older cars. This means lower risk of death or injury in crashes of newer cars, compared with older ones.

No reliable data are available to adjust for these offsetting effects. Besides, it isn't necessary to do so. Occupant death rates for General Motors cars that were not downsized provide ideal comparison groups for those that were downsized because, in each group, vehicle age-related effects should have the same influence. Institute researchers have computed death rates for comparison (i.e., not downsized) General Motors car types and found that, In five out of eight cases, such rates did not change or they actually decreased (see attached Status Report, Vol. 26, No. 3, p. 4). in the three cases where death rates did increase for newer but unchanged (i.e., not downsized) cars, the increases were smaller than those for the downsized cars. Such results confirm the Institute's earlier finding that downsizing leads to increased occupant death rates.

Another way to understand the impact of downsizing on car safety is to compare the occupant death rate for a recent model year with the rate that would have been expected in the absence of downsizing. institute researchers have calculated both the actual occupant death rate for 1988 model year cars in 1989 and the rate that would have been expected if the mix of '88 cars by size had been the same as in the 1975 model year. The actual occupant death rate was 2.2 per 10,000 registered 1-year-old passenger cars in 1989. However, if we had more large cars and fewer small ones—as we did In the 1975 model year, before downsizing—the death rate for the '88 models would have been much lower, 1.8 per 10,000 instead of 2.2. This means there were about 425 extra deaths in 1988 models during 1989, simply because the cars were smaller, on average, than the 1975 models. These are excess deaths in only one model year of cars during one calendar year. Additional deaths will occur each year in the 1988 models, as well as in other downsized cars, for as long as these cars are on the road.

Car size (wheelbase in inches)	Passenger car size distribution		Occupant deaths per 10,000 registered 1988 model cars during calendar year 1989
	1975 models registered in calendar year 1976	1988 models registered in calendar year 1989	
<95 inches	6%	13%	3.4
95–99 inches	19%	19%	2.5
100–104 inches	3%	36%	2.1
105–109 inches	6%	18%	1.6
110–114 inches	23%	10%	1.8
>114 inches	42%	4%	1.2

Overall occupant death rate for 1988 models in 1989=2.2

Expected death rate in 1988 models given 1975 model year size mix=1.8.

Everything else being equal, bigger is definitely safer. Some studies consider weight and size interchangeably but, in fact, exterior vehicle size is the important factor, the one we should focus on. it's true that both car size and weight influence occupant safety, but weight has tradeoffs in terms of safety. in crashes between two vehicles, weight protects the people in the heavy vehicle by increasing the forces transmitted to the occupants of the lighter vehicle. Car size, on the other hand, protects people in single- as well as multiple-vehicle crashes without imposing penalties on the occupants of other cars In the multiple-vehicle crashes.

This distinction between vehicle size and weight is important because it means safety isn't necessarily at odds with fuel economy. There are two basic ways to get more miles per gallon of gas—one is to Improve automobile technology so that cars burn fuel more efficiently, and the other is to reduce car weight so that less fuel is needed to move the vehicle. There are, In turn, two basic ways to reduce car weight—one is to use lighter materials when manufacturing the car, and the other Is to make the car smaller. It's only when cars are made smaller that fuel economy goals come into conflict with safety.

What we need to serve both safety and fuel economy are measures that increase miles per gallon without affecting vehicle size. Making cars lighter would be desirable and wouldn't undermine safety as long as removing weight doesn't also mean making cars smaller. If it were economically feasible, for example, to build cars out of titanium we could have more fuel-efficient vehicles without compromising safety at all. Unfortunately, such cars would be priced out of most of our reaches, so we've got to look for other safety-compatible fuel economy measures.

And we should improve fuel economy without giving up the gains we're looking forward to in the next few years in terms of safety. The addition of air bags to most new cars will save thousands of lives each year. Upgraded side impact protection

will save additional lives. These are important strides for which this subcommittee can take a great deal of credit, because it took the lead on many of them. But, now that we're making safety gains, we must not forget that the goal is saving as many lives as possible. Let's not even think about trading expected safety gains for improved fuel economy. Let's think instead about safety- compatible fuel economy alternatives.

And let's continue to keep the National Highway Traffic Safety Administration moving on a number of fronts—safety standards for light trucks and vans, head protection in side impacts, antilock brakes for big trucks, etc. Despite progress, there's a long way to go.

[The Insurance Institute for Highway Safety "Status Report" is not reproducible and may be found in the committee's files.]

Senator BRYAN. Thank you, very much, Mr. O'Neill. Professor Khazzoom, am I pronouncing it correctly?

Mr. KHAZZOOM. Yes.

Senator BRYAN. We are delighted to hear from you now.

STATEMENT OF J. DANIEL KHAZZOOM, PROFESSOR OF QUANTITATIVE STUDIES, SAN JOSE STATE UNIVERSITY, SAN JOSE, CA

Mr. KHAZZOOM. Thank you, Mr. Chairman. My name is Daniel Khazzoom. I am a professor of quantitative studies at San Jose State University. I received the Ph.D. in economics from Harvard and did my postdoctorate work in mathematics at Harvard. I taught at Cornell, NYU, McGill, Stanford, and the University of California at Berkeley. I served as chief econometrician of the Federal Power Commission while on leave of absence from McGill.

My research is primarily in the area of energy modeling and related fields, particularly fuel economy, conservation, and supply. Over the last 2 years or so my research results appeared in the Journal of Policy Analysis, the Journal of Econometrics, and the Energy Journal.

The purpose of my testimony is to comment on two recent models that generated interest in the debate on CAFE and safety, and conclude with a thought on the current debate.

The first model is the Crandall and Graham grant model published some 2 years ago. It estimated that because of CAFE the cars' average weight has dropped by 14 percent and as a result, single-vehicle highway fatalities have increased by 14 to 28 percent.

The model from which the authors derive these estimates contains numerous results that do not square with reality. They show that alcohol consumption has no significant effect on highway fatalities; that the percent of drivers in the 15- to 25-year age bracket has no significant affect on highway fatalities; speed has no significant affect on highway fatalities. These estimates conflict with all available evidence on the role of these factors in highway deaths. A model with such results cannot be used. The interrelationship among the variables in a model means that infirmities in one part will, in general, echo in the results of the other parts of the model. Hence there is no reason to assume that the other estimates of the model contains and that may look reasonable can indeed be trusted.

A model is one integral entity. It cannot be compartmentalized in general. One simply cannot pick and choose, choose those parts

of the model that look appealing and close one's eyes to what does not make sense in the same model.

In addition, because the model omits important explanatory variables its estimates exaggerate the effect of CAFE on car weight, as well as the effect of car weight on highway fatalities. I certainly would not use this model for policymaking. I think that public policy is entitled to more than that.

Very similar remarks apply to the second model which was developed by the Insurance Institute. It was published last September as an institute status report. The institute reports that as the MPG goes up by 1 mile the death rate goes up by 3.9 percent.

Regrettably the institute chose to follow a pick-and-chose procedure. They ignored the estimates of their model that made no sense and called attention to the estimates of the MPG variable only.

Moreover, the institute's model is far behind on meeting standards. Its adjusted explanatory power is incredibly poor, accounting for only 21 percent of the variation in the death rate.

It is ironic that the institute treats a model with such a low explanatory power as a revelation of the truth. The institute says, "What is true is this, a relationship exists between death rate and fuel use." Even this meager accomplishment turned out to be based primarily on outliers, that is, on the extreme cases among the observations they've used.

When I applied the robustness tests to the institute's model it fell apart. I took out just two outliers and the adjusted explanatory power of the model sunk to 8½ percent.

In another robustness test I did, the results were so awful that the adjusted explanatory power of the model dropped to minus 14 percent, which means that the model not only contributes nothing to an understanding of the death rate but is actually counterproductive to use.

Finally, Mr. Chairman, let me close with one thought.

Although the debate about safety is cast in the context of CAFE, it is really concerned more with the desirability of increased fuel economy as a policy goal. If CAFE kills, it does so by increasing the fuel efficiency, which is also what the gas guzzler tax does, what the gasoline tax does and what the high price of gasoline does in general.

Crandall and Graham and similarly the Insurance Institute argue that the decline in fatalities would have been more dramatic had CAFE not been in effect. But if CAFE is to be rolled back or it is to be repealed in order to reduce fatalities, why stop with CAFE? Perhaps rollback the gas guzzler tax, repeal the gasoline tax, and subsidize the consumption of gasoline to reduce the incentive to switch to fuel efficient vehicles. Then the highway death rate would be lower than today's. That would be an accomplishment, but the question is what is the opportunity cost?

What is at stake is an additional balance-of-payment deficit of $15 to $18 billion a year to finance the increased oil imports, increased U.S. vulnerability to OPEC's whims, and an increase in the cost of coping with the impact on global climate.

This is not an argument for CAFE or for any one specific measure in preference to another to enhance the fuel efficiency. It is an argument for keeping in focus the opportunity cost of doing away

with or freezing the measures that enhance fuel economy, be it CAFE, gas guzzler tax, or gasoline tax. Society would be short-changing itself if it chooses to focus only on the benefits of abolishing, trimming down, or freezing these measures while ignoring what it is going to forfeit in the process.

Because of the stakes involved an alternative to targeting CAFE deserves to be explored. We need to explore perhaps a two-pronged approach: one, encourage increased fuel economy and two, simultaneously pursue cost-effective remedial measures that offset or more than offset the adverse effect of fuel economy on safety.

Senator BRYAN. Mr. Khazzoom, we appreciate your testimony.

Mr. O'Neill, let me make sure that I fully understand what you are saying. I believe you are saying that you think that there is some ambiguity or lack of specificity as to what we mean when we talk about size. Interior volume is one thing, wheelbase is another, overall length of the vehicle may be still another. I believe you made one point that I want to be clear on, because I think some who have taken the Insurance Institute study may have taken some of your comments and observations out of context.

You are saying that the critical factor, as you view it, is size and not weight, in terms of the safety conclusions you reach in your study.

Mr. O'NEILL. Yes, Senator. Unfortunately, a lot of research addressing these issues is quite careless as to whether it is talking about size or weight; some studies actually use the terms interchangeably. We don't believe they are interchangeable, and we think the focus should be on some measure of the exterior dimensions of the vehicle because that is what protects the occupants.

Wheelbase is often used as a surrogate for size because that is readily available in the data systems that we can analyze. Width is also an important factor when it comes to protecting the occupants, and we think that those are the key dimensions and not weight per se. A small heavy vehicle is not desirable from a safety perspective nor from a fuel economy perspective. Lightweight large vehicles, not excessively powered vehicles—because there are all sorts of aspects to this issue, as I know you are aware, that go beyond just the size of the vehicle—are desirable from the point of view of safety and should not, in our view, conflict with fuel economy goals. I would like to just add that the institute, contrary to what Professor Khazzoom has said, has never claimed, never, ever claimed, that highway deaths are higher because of CAFE requirements.

What the institute has said, and will repeatedly say until we see evidence to the contrary, is that highway deaths are higher than they would have been because vehicles have become smaller, and I think there are many factors contributing to vehicles becoming smaller; CAFE being perhaps one of them, but we have never claimed that CAFE is the villain and the problem here. From my organization's perspective, we are concerned with highway safety, and in this particular instance we are concerned with occupants' safety, and smaller cars, unfortunately, work against occupant safety.

The dimensions that we ought to look at are the wheelbase and the width. Those are important dimensions when it comes to occu-

pant protection. There are all sorts of reasons in physics why those are important. Weight is also important in physics, but as GAO points out, and we agree, weight per se imposes penalties if you are in two-vehicle collisions. That is really illustrated by the unfortunately high fatality rate among passenger car occupants when they collide with very large trucks. The weight disparity there imposes a huge penalty on the occupants of the passenger vehicles, so we believe that the desirable car, from a safety perspective, is one that is large in terms of its exterior dimensions but is not excessively heavy, so we should be looking to the substitution of lightweight materials reducing, if you will, the density of vehicles.

Senator BRYAN. So, if the vehicles maintain the wheelbase and the width and the technology permitted those vehicles to slim down, I think that was Ms. Chelimsky's comment, if they were even lighter, you don't see a negative safety tradeoff by that track?

Mr. O'NEILL. Not at all, sir.

Senator BRYAN. Share with us, if you will, Ms. Chelimsky, how we get what seemingly is a rather odd conclusion that it is not the heavier or the lighter that reach the higher fatality levels, but it is the midsize. How does that come about?

Ms. CHELIMSKY. I can't give you an explanation yet. We are not at that point in our study. We are certainly going to look at that. There are many possible explanations. Mr. O'Neill mentioned that this category includes many high-performance cars, but other possibilities include driver demographics—who drives those cars—and what sorts of behaviors they may have. For example, is it a 16-year-old boy or is it a 50-year-old woman? These are important factors in looking at why things occur as they do.

The important thing to me is that looking at the data that I had seen up until now, I had no idea that I was going to see that midsize blip. I expected to see a curve that went down linearly with the big problems coming in the smallest cars and the heavy cars looking great.

Senator BRYAN. How much longer are you going to be conducting your research and when might we see the final report?

Ms. CHELIMSKY. Well, we have just begun it and we intend to look at quite a few variables. We do intend to look at track width. We do intend to look at wheelbase. We are trying to validate the research that has been done, reanalyzing in many cases to see whether we come out the same way. I can't at this point tell you definitively, but I would imagine that, we should be done within about 9, 10 months. That is my expectation at this point.

Senator BRYAN. You are suggesting in terms of death rate that we need to look at other factors. You suggest the age of the driver and the high performance capabilities of the vehicle are relevant. I think Mr. O'Neill would probably agree with that. For the record he's indicating that he does.

Mr. O'NEILL. Absolutely, Senator. There are many other factors, I would not want to sit here and say that car size is the only factor. The age of the car greatly influences its original design, the demographics of use, the performance levels of the car, all of these are factors that need to be paid attention to and they are all—they all influence the occupant death rates.

Ms. CHELIMSKY. Some of them are easier to pay attention to than others. It is very difficult to look at the care that someone takes in driving his or her car and that is always going to be a very crucial issue.

Senator BRYAN. Professor Khazzoom was critical of the two models that were used and he found a number of reasons and I am going to ask him about that in a second. Did you find similar concerns?

Ms. CHELIMSKY. We are concerned about the use of outliers as Professor Khazzoom is. Much of the research seems to look at a very small percentage of cars on each side of the spectrum, and then compares the lightest cars and the very biggest. I think that is one of the reasons why we haven't seen that midsize blip before.

Mr. O'NEILL. Senator, I would like to say that we have seen that midsize blip before. It is in the data.

Ms. CHELIMSKY. I agree with you.

Mr. O'NEILL. It is a function of high performance vehicles in that class. That is one of the reasons you have to control as we do in our studies, for factors like body style. For example, if you look at four-door cars as a group and you look at two-door cars as a group and then you look at sports model as another group, you will get some different relationships, and the one body style group that conventional wisdom has overturned, if you will, is sports cars. Small sports car have lower fatality rates, substantially lower than midsize sports and performance oriented cars. They show a reversal of the traditional patterns, so I don't want to denigrate the GAO, but it is not a new finding.

Ms. CHELIMSKY. I didn't mean it was a new finding. I meant that I didn't see it paid much attention to or written up. Well, perhaps it is there, you will show me where it is.

Senator BRYAN. Professor Khazzoom, for those of us who do not have the ability to make all these mathematical computations and ourselves devise a model that would meet your own criteria, what is a reasonable model upon which to base conclusions. You are critical of both the Insurance Institute's model, which was the second model that you described, and you were critical of the first model.

Mr. KHAZZOOM. Yes.

Senator BRYAN. Is it possible to devise a model that would come up with what you believe to be reliable data upon which policy conclusions can be made?

Mr. KHAZZOOM. Oh, yes. It is hard work. But it probably can be done. I am really hedging. I cannot say with 100-percent certainty. My feeling is if it cannot be done we ought to say so. We ought to say, "I worked on it but I can't make a go of it." The system has a lot of noise in it, and I can't capture the essence of the phenomenon. This would be preferable to misleading ourselves into believing that we have something substantive, when we don't.

Senator BRYAN. And you are saying basically to use the idiom of the street, the laymen's terms, you are saying the two models that have been offered really are not, in your own view, credible in terms of conclusions that policymakers ought to rely upon.

Mr. KHAZZOOM. I agree. In the case of the Crandall-Graham model, I think a lot of thought went into it. But it can take a lot more. It has to go back to the drawing board. The work of the In-

surance Institute, I don't really know why they chose to even write anything about it. I wouldn't have wasted any time publishing anything on that model. It has not even gone beyond the first stage.

Senator BRYAN. Can you tell us what are the factors, again in laymen's terms, that ought to be included in any model? What are the essential ingredients, if you will, in the recipe?

Mr. KHAZZOOM. Normally what you do is: you first study the phenomenon and you try to find out what are the main factors that propel it. If you tell me, for example, we are interested in the demand of a commodity, what is it that makes us buy that commodity? Is it income? Is it price? What are those factors that affect the demand for that commodity? You identify those factors and then you take observations from the real world—they could be observations over time or they could be cross-section, it depends on what you are trying to really investigate—and using estimation methods that have been developed in the literature of econometrics and mathematical statistics, you estimate the parameters of interest to find out, for example, what happens to the demand of that commodity if income were to increase by $1 or if the price were to increase by a certain amount.

Sometimes the relationship has fundamentals that you could capture fairly easily. That is also reflected in a measure of parameter reliability that is attached to your estimated parameters. If that measure is high, it tells you there is a very high probability that you really captured the essence of the phenomena that you are trying to investigate. When you find that kind of a result and you find that after you subjected the model to various tests, the model survived the tests, then you say I have a greater confidence in the results of that model, although there is never a certainty it will function very well, necessarily. You now use it and predict with it to relfect the uncertainty, I will tell you, watch out, there is, for example, a 10-percent risk that if you will take the forecast at face value, you may go astray. There is always that probability. What you try to do is develop a model where you have pinned down the parameters well enough that the probability that the user will be misled is hopefully small.

The institute didn't begin even that process. They estimated a model in which the explanatory power was 21 percent. You know what that means. It is like saying there are two people running for office, A and B. A poll is taken—12 percent of the people say I vote for A, 9 percent said I will vote for B, 79 percent were undecided. The pollster goes ahead and declares A as the winner, completely oblivious to the 79 percent who didn't express an opinion yet.

The institute did exactly the same thing. They failed to explain 79 percent of the variations in the death rate, which means that the parameters that they estimated are very far from the truth. If they had incorporated the variables that really propelled the death rate, those parameters would have changed drastically.

Senator BRYAN. You alluded to some of those factors, the age of the driver, the use of alcohol were factors which you said, I believe, were not included.

Mr. KHAZZOOM. The nature of the highway—for example, limited access highway—the trucks on the highways; all those variables have to be incorporated. None of those things were included. What

they have said, what they have testified—what they have reported before in their earlier publications is that the sex of the driver, male versus female, has an impact. They reported their earlier studies found out that female drivers usually are much more careful than male drivers, that the death rate is lower when the driver is female.

They also found in their earlier studies that the older the drivers the smaller is the likelihood of a death rate. But when they estimated their model, those two other variables turned out to be insignificant.

It turned out that for the driver's age and sex the institute's mode was not able to capture the parameters in a manner that would give you confidence in using them. The model estimates say, in effect, the effect of these two variables is zero. What also turned out is that—if we disregard the statistical insignificance—the females turned out to be more the villain than the male, which is contrary to what they have found out historically in their earlier studies.

Now, what a person does when confronted with these results is go to the drawing board and ask, Why is it that I got those results? One doesn't just put the variables together and say here it is, use it. Their results mean there is something fundamentally wrong with the model. Something is missing or maybe their sample is not representative. Instead, they ignored that; they closed their eyes to the fact that they got results that conflicted with what they have historically been saying, and picked out the part of the model that indicated that the MPG is a killer. They then drew a curve in their status report of September 1990 showing that as the fuel economy goes up, the death rate goes up.

And at the time I got that report I refused to read it. I thought this is—I don't want to use the word. It is an absolute waste of time.

Senator BRYAN. I imagine this debate will continue long after this panel.

Mr. O'NEILL. We would like to respond for the record but we'll do it in writing, because it is an esoteric argument we are getting into and we totally disagree with Professor Khazzoom.

Senator BRYAN. We'll certainly agree. We will keep the record open and other members of the subcommittee once they have a chance to read the testimony that you have offered today will undoubtly want to ask questions of you. We greatly appreciate your attendance here today and appreciate the testimony that you have shared for the record and this subcommittee hearing will stand adjourned.

[Whereupon, at 11:40 a.m., the hearing was adjourned.]

APPENDIX

PREPARED STATEMENT OF THE NATIONAL ASSOCIATION OF INDEPENDENT INSURERS

The National Association of Independent Insurers (NAII), a leader in the 20-year battle for automatic crash protection systems, such as life-saving airbags is pleased to submit this statement supporting reauthorization of the National Highway Traffic Safety Administration (NHTSA) and proposals to improve vehicle occupant protection and crashworthiness.

NAII is a national trade organization of more than 550 property and casualty insurance companies, which write about one-third of the automobile insurance in the country.

NAII has long been a proponent of automatic protection systems in vehicles, particularly airbags, to protect occupants in crashes. We fought alongside others in the Coalition to Reduce Car Crash Injuries in the early 1980's in support of federal requirements mandating such systems. As a direct result of these efforts, we are starting to see automatic restraints being phased into the fleet in large quantities. We want to particularly commend the automakers who are offering airbags, because we believe airbags offer the greatest hope for reducing deaths and serious injuries on our highways.

For this reason, NAII has endorsed S. 591, a new proposal requiring full front airbags, which was recently proposed by Sen. Bryan, Sen. Danforth and other members of the Senate Commerce Committee.

Another battle NAII was involved with in the early 1980's was trying to preserve the federal 5 mph bumper standard to assure consumers would receive bumpers with more bumper protection than the "egg shell" exteriors which were being used prior to the standard. Unfortunately, NHTSA weakened the standard in the face of economic evidence of its value to consumers in reducing the costs associated with low-speed, fender-bender crashes. The 5 mph bumper standard should be reinstated.

At a minimum, NHTSA should help develop a program to provide consumers with information on bumper strength for comparison shopping. The agency promised to do this when it weakened the standard, and the automakers have told us they are ready to help develop a bumper information program. If NHTSA fails to act, there is evidence that states will try to do so, and the result could be overregulation and consumer confusion.

Several key provisions of the NHTSA reauthorization bill from the last Congress, including improvements In the area of side impact protection and light truck and van safety, have been or are being addressed by a revitalized NHTSA under the able leadership of Administrator Jerry Curry. We want to commend Administrator Curry for his work to promote highway safety and to speed up the rulemaking process at NHTSA, and we hope he will continue his positive efforts.

We look forward to working with the Commerce Committee, NHTSA and staff on these and other highway safety issues during this session of Congress.

We at NAII are very concerned about auto insurance cost containment, as you might expect. The attached booklet describes what we believe are the major problem areas and includes recommendations for addressing them, primarily at the state and local level. If we can make safer vehicles and encourage drivers to be more safety conscious, we can reduce losses and contain costs of highway crashes.

PREPARED STATEMENT OF THE NATIONAL ASSOCIATION OF GOVERNORS' HIGHWAY SAFETY REPRESENTATIVES

I. INTRODUCTION

This statement has been submitted by the National Association of Governors' Highway Safety Representatives (NAGHSR) which is the national association of state highway safety offices. Its members are appointed by their Governors to devel-

op and implement their state highway safety program and to administer the federal highway safety grant programs for their respective states. The Association is primarily concerned about driver behavior issues such as impaired driving, occupant protection, pedestrian, bicycle, motorcycle safety, safety enforcement, and truck safety.

The comments are directed at the Administration's reauthorization proposal. The statement will also offer NAGHSR's suggestions for reauthorizing the federal highway safety grant programs.

II. ANALYSIS OF DOT HIGHWAY SAFETY REAUTHORIZATION PROPOSAL

NAGHSR's reaction to the Administration's proposed reauthorization is mixed.

On the one hand, the Association is very pleased that DOT has proposed only minor modifications to the Sec. 402 State and Community Highway Safety grant program (23 U.S.C. 402). We strongly believe that the program has been a successful, effective one and has been a major contributor to the reduction in the nation's overall fatality rate. NHTSA and NAGHSR share the belief that the 402 program is the cornerstone for highway safety activities at the state level and that, without the federal grant program, very few states would have the ability or resources to undertake highway safety activities. NHTSA and NAGHSR also share the belief that the 402 program "ain't broke" and needs no fixing. We are gratified that the Administration's reauthorization position reflects that common belief.

We also believe that the Administration should be given kudos for suggesting the concept of a flexible bonus program which would provide additional incentives to states for enacting specific highway safety' countermeasures. A flexible program for states that make improvements on a broad range of highway safety issues is an idea that NAGHSR has strongly endorsed. We believe that such an incentive program would eliminate the fragmented approach to highway safety which currently characterizes the federal incentive grant programs and would promote comprehensive highway safety planning and implementation at the state level. Such a program could positively motivate the states to act on highway safety matters without being just another entitlement program.

We are also pleased that the Administration has eliminated earmarkings in the 402 program, has continued to require the minimum age twenty-one drinking age, and has required that states develop safety management plans as a condition of eligibility for highway construction funds.

Proposed Funding Levels

On the other hand, we are very concerned about and do not support the proposed funding levels, the impaired driving eligibility criteria, the specific highway safety bonus program that the Administration has proposed, and the proposed changes in speed compliance policy.

NAGHSR believes that DOT's proposed funding levels for the 402 program represents a significant step backwards for highway safety. The Administration has proposed that the NHTSA 402 program should be authorized at $115 million—an 8.7 percent decrease in the authorization level—and that the federal share should be dropped from 75 percent to 60 percent. The 402 program has not been funded at the full authorization level in the last seven years, so it is very unlikely that it would be funded at the authorized level in the future. if actual funding for the basic federal highway safety grant program falls below $100 million (excluding earmarked funds), then the funding will be so insufficient that states will not be able to maintain the achievements they have made in highway safety, nor progress further against increases in motor vehicle deaths and injuries which the National Academy of Sciences and others have projected for the future.

NAGHSR feels that the $115 million level is very inadequate given the enormity of the highway safety problem. In 1989, 46,900 people died in motor vehicle crashes—as many as were killed in the Vietnam War. In that same year, 1.7 million people were injured—140,000 of them permanently. This cost the nation a total of $37 billion in lost wages, medical expenses, welfare costs, and other costs. Despite the significant progress that has been made in highway safety over the last several years (as measured in the fatality rate decline from 5.2 to 2.1 deaths per 100 million miles of travel), considerably more needs to be done. More federal, state and local resources will have to be devoted to saving lives. in light of the rising balance in the Highway Trust Fund, NAGHSR believes that more resources could easily be devoted to highway safety.

We are also perplexed by the Administration's proposal to drop the federal share for the 402 program from 75 percent to 60 percent. It appears that the sole justification for this change is to ensure that the federal share is consistent with that proposed for the Urban/Rural program. NAGHSR strongly maintains that there is no

reason for the federal share to be lowered since the 402 program is a seed money program. By the end of the third year of a highway safety project, all federal funding is eliminated and projects must be supported by non-federal funds. Most states require projects to have a declining share of federal funds over the three-year life of the project and an increasing share of state, local, and private sector funds during that time peril. Unlike construction programs, the 402 program does not encourage state and local dependency on federal funds and does leverage state, local and private sector funds. it makes no sense, therefore, to lower the federal share.

Further, we believe that the proposed level of funding for the FHWA 402 program is inadequate. That program has been funded at a minimal level for ten years, and the Administration is proposing that the program continue at the same low level for each of the nest five years. The Administration proposal ignores the growing importance the FHWA 402 program will have in the nest decade. As the country's population ages and the size of the elderly population increases, there will be tremendous pressure to upgrade traffic control devices and enlarge traffic signs in order to improve safety for the aging population. Among other things, the FHWA funds can be used by states to purchase and maintain traffic signs and traffic control devices. More FHWA 402 funds will be needed, not less.

The sole increase in funding for non-construction highway safety grant programs is in the safety bonus set-aside. Total funding for non-construction programs would increase by $50 million a year above current spending levels for each of five years. (See attachment #1). Although total funding for the federal-aid highway bill would increase by $4.3 billion over five years according to the DOT proposal, funding for non-construction highway safety grant programs increase by only $500 million during that same time period. This represents only 5.8 percent of the total highway funding increase. Between FY 91 and 96, the federal-aid highway program will have increased by more than $7 billion if the Administration's proposal is enacted, yet the federal highway safety programs will receive an extremely small share of the additional funds. Non-construction highway safety grant programs would continue to represent less than 1 percent of federal-aid highway funding.

NAGHSR is also extremely concerned about the Administration's proposal to level-fund non-construction highway safety programs over the five year authorization period. Funding for the NHTSA 402 program has not increased in the last seven years, as shown in attachments #2. Funding for the FHWA portion of the 402 program has not increased in the last ten years, as shown in attachment #3. In FY 91, funding for the federal-id highway program increased by $2.3 billion, yet the federal non-construction highway safety grant programs did not receive one penny of the additional funds. If inflation were taken into account, funding for the federal highway safety grant programs would actually show a 30 percent-40 percent decrease over the last ten years. In effect, state highway safety offices have been forced to do more with considerably less.

Under the Administration's proposal, funding for the federal highway safety grant programs would continue to be "flatlined." (See attachment #4.) The NHTSA 402, FHWA 402 and the non-construction portions of the safety bonus set-side would each remain at a constant level throughout the five-year authorization period. By contrast, the construction portion of the safety bonus set-aside would grow from $5 million in the first year to an astounding $130 million by the fifth year. By the end of the authorization period, the construction portion of the set-aside is almost double the non-construction portion. In effect, the proposed funding would tilt state administering agencies away from safety toward construction.

Impaired Driving Programs

NAGHSR is also very disappointed that the Administration did not make any changes in the two federal impaired driving incentive grant programs (23 U.S.C. 408 and 410) beyond the changes already enacted by Congress last year. The reauthorization of these programs presents a tremendous opportunity to restructure, streamline, update and target those programs on impaired driving countermeasures which will have the most impact at the state and national levels. We also believe that now is the time to replace stringent eligibility criteria with ones that are performance-oriented. This would give states the flexibility to meet national impaired driving goals in a way best suited to state needs, capabilities and resources. The Administration has chosen not to take advantage of this opportunity even though national organizations like NAGHSR and MADD support these changes.

Additionally, NAGHSR is very concerned about the proposed level of funding for impaired driving. The proposal ensures that $25 million will be spent on alcohol programs—exactly the level of current spending. Current authorization for the 408 and 410 programs is more than $50 million. Considering the fact that alcohol is involved in half of all motor vehicle fatalities, federal support for impaired driving programs

should be considerably higher than current funding levels. We believe that $25 million for impaired driving is grossly inadequate and totally unacceptable.

Safety Incentive Program

NAGHSR is also very disappointed with the specific safety bonus set-aside proposal that the Administration has proposed. In order to qualify for safety bonus funds, a state would have to satisfy a number of eligibility criteria, including passage of key impaired driving laws and implementation of impaired driving programs, passage of mandatory occupant protection legislation, implementation of bicycle and pedestrian safety programs, etc. A state would be assigned credits for meeting particular criteria and would be given grants in proportion to their states' contribution to the Highway Trust Fund and to the number of points accumulated. $75 million of the bonus funds must be used for safety non-construction programs, but the remainder may be used for any program authorized under Title 23, including highway construction programs. It is our firm belief that none of the bonus funds above the $75 million earmarked portion, will be used for non-construction safety programs. In fact, in my own state, the non-earmarked funds are constitutionally required to be used for construction purposes.

A state will have to develop and implement a number of safety countermeasures in order to receive the safety bonus funds. In fact, the State Highway Safety Agencies (SHSA) are already advancing highway safety programs which would help the states qualify for the incentive funds. Yet, those same agencies would receive a relatively minor increase in federal highway safety grant funds while the state Departments of Transportation (DOT) would receive the lion's share of safety bonus incentive funds. In other words, the SHSA's would bear all the costs of qualifying for the Incentive program yet receive very little of the benefits. The safety bonus program, in our view, is lopsided and inequitable.

The bonus program would also put tremendous pressure on state transportation agencies to take over the non-construction highway safety function in order to gain better control of the bonus grant funds. At present, only about one-third of the SHSA's are housed in state departments of transportation. Historically, state DOT's have been far more concerned about roadway safety than driver behavior. If the state highway safety programs were moved to the state DOT's, it is very likely that driver behavior programs would be given less attention at the state level—not more. Although NAGHSR strongly supports the objective of encouraging SHSA's and state DOT's working much more closely together, we do not believe that the proposed safety bonus set-aside Is the best way to accomplish this objective.

Speed Compliance

Finally, we are disappointed that the Administration's bill does little to address the issue of compliance with posted speed limits. The bill replaces the compliance formula with a simple self-certification requirement for speed monitoring and data collection and eliminates the earmarking for speed compliance on 55 mph roads without making it a funding priority or replacing it with any other speed public education or enforcement programs. Despite the fact that NHTSA's own studies have shown that increased speeds on rural interstates have caused an increase in the number of fatalities, DOT's proposal does little to address the problem. Taken together, DOT's proposal seems to be deemphasizing the importance of speed compliance and backpedalling on the issue.

III. NAGHSR REAUTHORIZATION RECOMMENDATIONS

Base Highway Safety Program

NAGHSR strongly believes that the 402 State and Community Highway Safety grant program has been a small but effective program and needs only minor fine tuning. In Nevada, for example, the fatality rate has dropped from 6.98 to 3.25 deaths per 100 million miles of travel since the 402 program's inception, while at the same time, total vehicle miles of travel as well as total number of registered vehicles in the state have more than tripled and the state's population has increased by 745 million persons. (See attachment #5.) Without the 402 program, this dramatic decline in the fatality rate could not have been achieved.

The 402 program has also been used by the states to successfully halt developing highway safety problems. Last year, for example, seven children were killed in Virginia in motor vehicle crashes, six of whom were not in child safety seats. In August, the state implemented a 402-funded, multi-part campaign to address the problem of child safety seat usage. Virginia conducted a survey with law enforcement agencies and others In order to determine how well the state's child safety seat law was being enforced. The state announced a media blitz on the issue in August and unveiled the "Please be Seated" campaign In February which encouraged citizens

to report child safety seat violations to law enforcement agencies. The state also doubled the number of hospitals involved in the cooperative safety seat program for indigent parents and increased the child safety seat loaner program by one-third. As a result of these 402-funded interventions, child passenger fatalities are down to one this year.

States have also successfully used 402 funds to leverage state and local dollars. In 1985,402 funds were used by Washington State to establish 19 DWI task forces in 16 different counties and two cities serving 85 percent of the state's population. The task forces are expected to be funded in FY 92 with $860,000 of federal 402 and 408 (23 U.S.C. 408) funds but $1.2 million of state funds, $800,000 of local funds, $100,000 of corporate funds, $520,000 of local volunteer time and $2.1 million of local in-kind contributions. Not all 402-funded projects, of course, are leveraged to such a great extent.

The Association would like to see the 402 program focused on the three major contributors to motor vehicle crashes: impaired driving, inadequate occupant protection, and speed. NHTSA should continue to identify national goals and programs (with the active participation of states and others) for each priority. Considerably more resources and attention will have to be devoted to speed compliance by NHTSA. These 402 funding priorities should be established through rulemaking and reviewed periodically, as is presently required. However, states should have the flexibility to fund highway safety countermeasures in other areas (such as bicycle safety, emergency medical services, community traffic safety programs) as long as they can identify and substantiate each highway safety problem and can submit an annual Highway Safety Plan (HSP) which outlines programs for addressing each problem.

We strongly recommend that traffic records should not continue to be treated under the 402 program as just another highway safety countermeasure. In fact, traffic records—highway safety data collection, reporting and analysis—are the basic infrastructure that supports federal and state highway safety efforts. Without adequate data, states cannot identify the most significant highway safety problems in their jurisdiction, develop an HSP that adequately addresses state highway safety needs and concerns, or evaluate the effectiveness of federally-supported state highway safety programs. Without adequate federal support, state highway safety data will continue to be incomplete and not uniform from state to state. In order to rectify these problems and place much higher priority on traffic records, NAGHSR recommends that 402-funded traffic records projects should be funded with a higher, non-declining federal match.

NAGHSR also strongly urges that the 402 program should be funded at significantly higher levels. If safety is such a high priority to the Administration and Congress, then it is time to match that rhetoric with funds. We recommend that the 402 program should be funded at $140 million in FY 92, rising to $200 million by FY 96. If this action is taken, it would restore the program to the level that it was in FY 81. We also urge that the federal share should statutorily be established at 75 percent and not be dropped to 60 percent.

With respect to the FHWA portion of the 402 program, we recommend that the program should be funded at $25 million in FY 92, with $5 million additional in each subsequent fiscal year. This action would allow the program to be large enough to have an impact at the state level and would increase the program commensurate with the need to improve traffic control devices for the elderly.

This increase would also help accomplish a major objective of the Administration's safety bonus set-aside—to encourage SHSA's and state DOT's to work more closely together. Under the FHWA 402 program, the State Highway Safety Agencies and the state DOT's already work together to determine which projects should be funded. Proposed projects are included in the state HSP and are submitted to NHTSA for approval. With more FHWA 402 funding, there would be more reason for the two different state administering agencies to work together and no need to have a separate set-aside to encourage this working relationship.

Impaired Driving Incentive Funds

NAGHSR recommends that the 408 and 410 incentive grant programs should be merged into a single, more streamlined and targeted program. We suggest that the eligibility criteria should be limited to the five most significant impaired driving countermeasures that will truly make a difference at the state and national level. States would be eligible for incentive funds if they had:

(1) laws which would make it illegal to have a .08 blood alcohol concentration (BAC);

(2) laws which would promptly suspend a person's driver's license for driving while impaired;

(3) laws which would provide swift punishment for impaired drivers either through mandatory jail time or a lengthy period of community service;

(4) laws which would require the use of sobriety checkpoints;

(5) a self-sustaining impaired driving program.

NAGHSR also recommends that states should be allowed to waive at least one eligibility criteria based the state's past performance in the impaired driving area. For example, since alcohol is involved is approximately half of all motor vehicle crashes, then the waiver could be based on the number of fatalities that are below the 50 percent level. States could be allowed to waive one eligibility criteria if the number of fatalities involving impaired drivers with BAC of .10 (the level at which a driver is deemed to be impaired in most states) or above were between 40 percent and 45 percent of all fatalities. States could be allowed to waive two of the eligibility criteria if the number of impaired driving fatalities were less than 40 percent of all fatalities. (States would be required to use fatality data as reported in the Fatal Accident Reporting System [FARS].) The performance-based waiver would give the states greater flexibility to address the impaired driving issue in a way best suited to state needs and resources. The waiver would give states credit for reducing the number of impaired driving fatalities in their state without penalizing them for failing to implement very specific programs or processes.

The Association urges that the impaired driving incentive program should be authorized for no less than three years at a level of $25 million in the first year and $50 million thereafter. The federal share for the program should be 75 percent.

Occupant Protection Incentive Program

NAGHSR recommends that a federal occupant protection incentive program should also be established. In the first year of the program, funds should be made available to states that have a mandatory occupant protection law for all front seat occupants of passenger vehicles as well as a mandatory motorcycle helmet law for riders of all ages. States should be eligible for additional laws in subsequent years if they satisfied specific occupant protection and motorcycle use levels in each subsequent year (e.g. 50 percent safety belt use and 75 percent motorcycle helmet use). States would be required to use the incentive grant funds for the development and Implementation of occupant protection education, training, public information and enforcement programs. NAGHSR recommends that this incentive program should be authorized for not less than three years at a level of $25 million in the first year and $50 million thereafter. The federal share should be 75 percent.

Funding Proposal

NAGHSR would like to offer an option for funding all the non-construction federal highway safety grant programs. We recommend that all the non-construction programs should be funded by earmarking a portion of the federal-aid highway program for highway safety. A two percent earmarking of $15.829 billion (the Administration's proposed funding level for FY 92) would yield $318 million—an ample amount to cover the costs of the non-construction highway safety programs. (See attachment # 6.)

Future funding would rise and fall in keeping with the funding for the federal-aid highway program. This would ensure that safety is an integral part of the federal program, not just an afterthought.

National Association of Governors' Highway Safety Representatives is pleased to have the opportunity to submit comments for the Subcommittee's consideration.

ATTACHMENT #1.—Non-Construction Highway Safety Grants

[In millions]

	Fiscal year 1991 enacted	Fiscal year 1992 requested	Fiscal year 1996 proposed
NHTSA 402 grants	114.65	115	115
FHWA 402 grants	10	10	10
408 alcohol incentive grants	25	0	0
410 alcohol incentive grants	5	0	0
Safety bonus set-aside (non-construction)	NA	[1]75	75

ATTACHMENT #1.—Non-Construction Highway Safety Grants—Continued

[In millions]

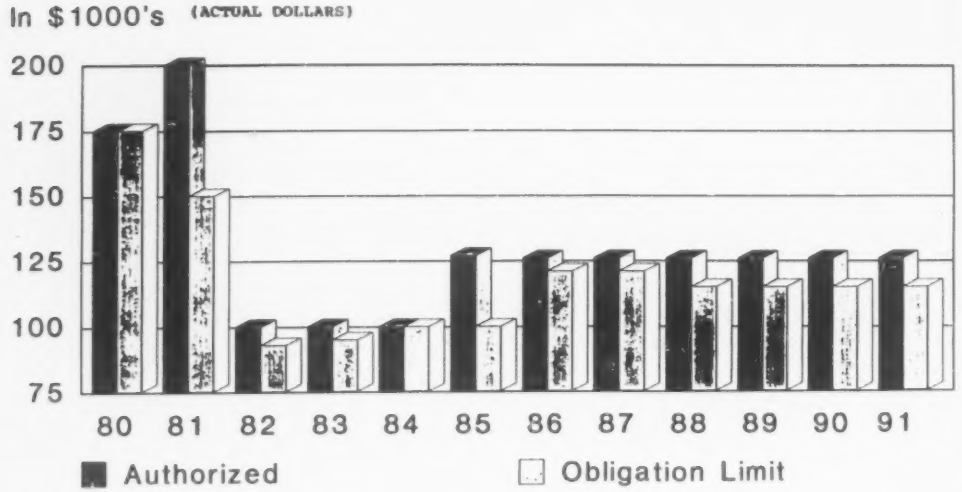
	Fiscal year 1991 enacted	Fiscal year 1992 requested	Fiscal year 1996 proposed
Total	150	200	200
Difference	0	50	50

[1] The safety bonus set-aside replaces the 408 and 410 incentive grant programs. The bonus program is authorized in four separate places in the DOT reauthorization in the following manner: NHTSA 402, $25 million; FHWA 402, $25 million; 408/410, $25 million; and the total is $75 million. Funds are aggregated and may be spent for any 402-related purpose; however, at least $25 million must be spent on impaired driving programs.

ATTACHMENT 2

Highway Traffic Safety Grants

Section 402 Authorizations and Obligation Limits

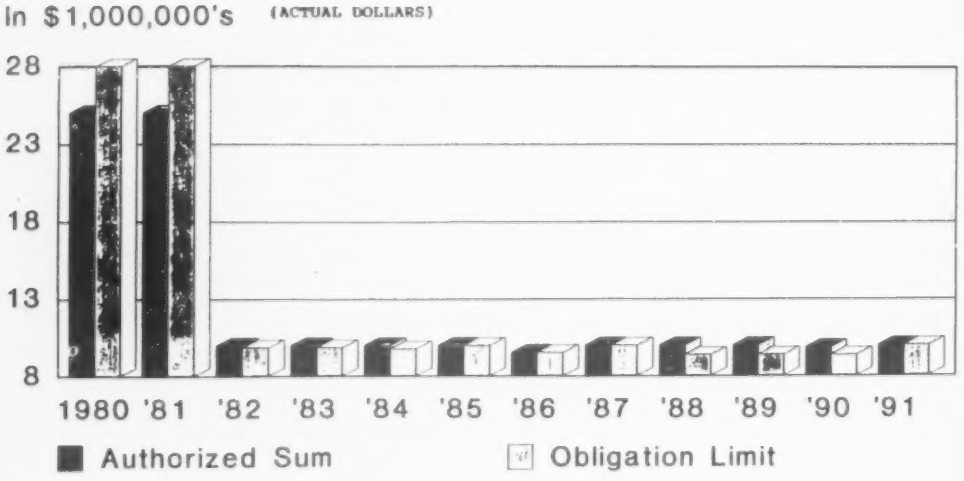


SOURCE: U.S. Department of Transportation

ATTACHMENT 3

Highway Safety Program Funding

Section 402 - FHWA Portion



SOURCE: U.S. Department of Transportation

ATTACHMENT #4.—Highway/Transit Authorization Levels by Bill Title

[Dollars in millions]

Program	Fiscal year 1992	Fiscal year 1993	Fiscal year 1994	Fiscal hear 1995	Fiscal year 1996	5-year total
Title I:						
National Highway System	7,672	7,795	8,056	8,855	11,158	43,536
Urban Rural Program	3,900	3,960	4,135	4,540	5,710	22,245
Safety Bonus Set-Aside	—5	—55	—80	—105	—130	—375
Bridge	1,820	1,895	2,000	2,200	2,750	10,685
Apportioned	—1,590	—1,615	—1,670	—1,840	—2,310	—9,025
Discretionary	—230	—280	—330	—380	—440	—1,660
Interstate completion	1,800	1,800	1,800	1,800	0	7,200
Boston I Projects (add-on)	—100	—800	—800	—850	0	—2,550
Interstate Subs. (hwy.)	240	240	240	240	0	960
Emergency Relief	100	100	100	100	100	500
Federal Lands	290	296	305	332	369	1,592
Forest Highways	—100	—102	—105	—114	—127	—548
Park Roads	—95	—97	—100	—109	—121	—522
Indian Reservation Roads	—95	—97	—100	—109	—121	—22
Highway Tax Compliance Project	0	13	13	13	13	52
Right-of-Way Revolving Fund, FHWA	0	0	0	0	0	0
University Transportation Centers, FHWA	7	7	7	7	7	35
Title I totals	15,829	16,106	16,656	18,107	20,107	86,805
Title II:						
FHWA 402	35	35	35	35	35	175
Safety Bonus Set-Aside ..	—25	—25	—25	—25	—25	—125
NHTSA 402	140	140	140	140	140	700
Safety Bonus Set-Aside (section 402)	—25	—25	—25	—25	—25	—25
NHTSA Section 403	45.869	45.869	45.869	45.869	45.869	299.345
Alcohol Safety (section 402)	25	25	25	25	25	125
Vehicle Safety and Costsavings	75.207	75.207	75.207	75.207	75.207	376.035
National Driver Register (section 407)	6.131	6.131	6.131	6.131	6.131	30.655
Title II totals	327.207	327.207	327.207	327.207	327.207	1,636.035
Title III:						
Motor Carrier Safety Assistance	60	80	100	100	100	440
Motor Carrier Safety	49.317	49.317	49.317	49.317	49.317	246.585
Title III totals	109.317	129.317	149.317	149.317	149.317	868.585

SOURCE.—U.S. Department of Transportation.

ATTACHMENT #5

Year	Nevada											U.S. fatality rate per MVMT
	Total crashes	Fatal accidents	Fatalities	Injury accidents	Injuries	PDO accidents	Licensed drivers	Registered vehicles	Population	VMT	Fatality rate	
1966	13,814	175	212	3,558	5,552	10,081	308,560	305,038	453,530	3,039	6.98	5.5
1967	14,449	161	181	3,565	5,424	10,723	340,123	315,123	473,939	3,012	6.01	5.26
1968	15,167	182	219	4,228	5,933	10,757	329,672	335,463	495,266	2,999	7.30	5.19
1969	18,204	205	232	4,829	7,165	13,170	337,155	384,885	517,553	3,095	7.50	5.04
1970	22,496	211	257	5,000	7,572	17,277	339,063	395,174	488,738	3,460	7.43	4.74
1971	16,757	230	269	5,340	5,766	12,700	356,749	419,384	500,000	3,740	7.19	4.46
1972	23,585	226	259	5,450	8,151	17,090	371,254	446,663	550,000	3,889	6.66	4.43
1973	25,210	234	267	6,062	8,969	18,914	389,299	488,105	575,000	4,281	6.24	4.12
1974	22,937	187	216	5,429	8,344	17,321	398,337	510,627	583,563	4,184	5.16	3.53
1975	22,223	193	221	5,958	9,171	16,072	419,032	518,434	590,300	4,600	4.80	3.35
1976	23,655	192	224	6,452	9,837	17,011	450,086	568,017	612,666	4,890	4.58	3.25
1977	26,155	226	256	7,127	10,927	18,802	479,251	624,403	633,397	5,298	4.83	3.26
1978	31,582	271	312	8,885	13,670	22,426	527,697	670,162	677,803	5,750	5.43	3.26
1979	32,476	308	365	9,643	14,500	22,710	565,530	709,643	722,209	5,984	6.10	3.34
1980	33,985	302	346	8,696	13,410	24,986	626,503	712,939	799,184	6,083	5.69	3.35
1981	33,683	259	295	8,327	12,721	25,098	642,556	757,609	852,226	6,453	4.57	3.17
1982	31,197	248	280	7,540	11,387	23,409	656,372	790,700	886,543	6,512	4.30	2.76
1983	30,796	219	252	7,821	11,827	22,756	676,360	812,281	917,870	6,648	3.79	2.58
1984	31,431	215	249	8,122	12,169	23,094	681,616	726,024	914,615	7,300	3.41	2.57
1985	30,581	227	259	8,845	13,652	21,509	695,075	825,727	975,615	7,708	3.36	2.47
1986	31,577	204	233	9,848	15,068	21,525	709,178	851,782	1,007,850	8,092	2.88	2.47
1987	33,187	239	262	10,498	16,101	22,450	720,665	896,573	1,053,230	8,545	3.07	2.43
1988	35,583	256	286	11,253	17,100	24,074	750,693	936,402	1,095,880	9,111	3.14	2.4
1989	38,118	275	307	12,513	19,214	25,330	792,407	966,307	1,198,450	9,436	3.25	2.2

ATTACHMENT #6.—Administration's Proposed Highway Trust Fund Authorization Levels

[Dollars in millions]

	Fiscal year 1992	Fiscal year 1993	Fiscal year 1994	Fiscal year 1995	Fiscal year 1996
2.0 percent	15,829	16,106	16,656	18,107	20,107
1.75 percent	318	322	333	362	402
1.50 percent	237	242	250	272	302
1.25 percent	198	201	208	226	251
1.0 percent	158	161	167	181	201

Proposed Funding for Non-Construction Highway Safety Programs as a Percentage of Earmarked Federal-Aid Highway Funds

[Dollars in millions]

	Fiscal year 1992	Fiscal year 1993	Fiscal year 1994	Fiscal year 1995	Fiscal year 1996
	1.5 percent	1.75 percent	1.75 percent	2.0 percent	2.0 percent
NHTSA 402	140	155	170	195	215
FHWA 402	25	30	35	40	45
Impaired driving	25	50	50	77	87
Occ. Pro	25	35	35	50	55
408 hold harmless	22	12	1	0	0
Totai	237	282	291	362	402

LETTER FROM BRIAN O'NEILL, PRESIDENT, INSURANCE INSTITUTE FOR HIGHWAY SAFETY

APRIL 25, 1991.

The Honorable RICHARD H. BRYAN,
U.S. Senate,
Washington, DC 20510

DEAR SENATOR BRYAN: At the April 11 hearings before the Senate Consumer Subcommittee, Committee on Commerce, Science, and Transportation on the Reauthorization of the National Highway Traffic Safety Administration, a witness, Mr. J.D. Khazzoom, criticized one piece of the Insurance Institute for Highway Safety analysis of the relationship between fuel economy and passenger car occupant death rates. The attached paper responds to these criticisms, which are without merit.

Mr. Khazzoom's basic criticism of the Institute analysis was that, because the relationship between fuel economy and occupant death rates in 1985–87 four-door passenger cars only explained 21 percent of the variability in the death rates, no meaningful conclusions can be drawn. As the attached paper explains, this criticism is nonsense; it is equivalent to saying that we know nothing about the risk of heart disease caused by high levels of serum cholesterol because this well-documented risk factor only explains 17 percent of the variability in deaths from heart disease.

I request that this letter and the attached rebuttal to Mr. Khazzoom's invalid criticisms be made part of the hearing record.

Sincerely,

BRIAN O'NEILL,
President.

RESPONSE TO J.D. KHAZZOOM: THE ASSOCIATION BETWEEN FUEL ECONOMY AND OCCUPANT DEATH RATE IN CARS

The Insurance Institute for Highway Safety (IIHS) published a Special Issue of its newsletter, *Status Report,* focusing on the role of safety in the fuel economy debate. (See *Status Report,* Vol. 25, No. 8.) Commenting before the Senate Consumer Subcommittee on Commerce, Science, and Transportation on the Special Issue, J.D. Khazzoom asserted that the reported statistical relationship between the fuel econo-

my ratings of cars and their fatality rates was invalid. Mr. Khazzoom failed to substantiate his claims, and more recent data show that the statistical relationship between fuel economy ratings and occupant death rates is even stronger than was originally stated. Mr. Khazzoom's objections to the empirical relationship between fuel economy and safety are without merit.

The *Status Report* special issue presented a thorough discussion of many of the complex questions that are related to fuel economy. The focus was on the negative safety consequences of downsizing cars. As part of this discussion, it was stated that "* * * every one mile-per-gallon improvement in fuel economy translates into a 3.9 percent increase in death rate." This estimate was derived by statistically comparing (log transformed) occupant death rates in 47 recent model four-door cars to their Environmental Protection Agency (EPA) fuel ratings and to some other variables.

Mr. Khazzoom had two main arguments. First, because the regression equation accounted for only 21 percent of the death rate variation, Mr. Khazzoom stated, "* * * the model's estimates can very well be very far from the truth." Second, Mr. Khazzoom stated that focusing on the "outlier problem" he demonstrated that "* * * the reported regression results are not robust at all." He then concluded that because of these problems "no conclusion of the form 'more fuel efficient cars have greater fatalities' can be drawn from the IIHS estimates." Each of these claims is addressed below.

Claim 1. Mr. Khazzoom is mistaken in believing that regression analysis can produce valid conclusions only if it explains more of the variation than did the IIHS regression. The amount of variation explained by, and the validity of, the conclusions derived from regression analysis are not directly related.

The fact that 79 percent of the variation in the dependent variable (death rate in this instance) was not explained by the predictor variables (miles-per-gallon, etc.) simply means that there are other factors that also affect death rates. The amount of variation not explained by the predictors is a measure for the scatter of observed values around their predictions, but contrary to what Mr. Khazzoom claims, the magnitude of such scatter is not directly related to the way a dependent variable depends on its predictors. This latter dependence is specified by the regression coefficients.

For example, consider the problem of unexplained variation in another context: Coronary heart disease is a major public health problem that has been studied extensively over the past 30 years. Among men aged 46 to 57 major known risk factors (e.g., cigarette smoking, high blood pressure, and high serum cholesterol levels) jointly explain only half of the variability in coronary heart disease deaths. The well-known relationship between high serum cholesterol and heart disease risk has led to many national and local public health efforts to lower the fat and cholesterol content of the American diet. If high serum cholesterol levels could be eliminated as a risk factor, only 17 percent of coronary heart disease deaths in men aged 46 to 57 could be prevented. According to the logic of Mr. Khazzoom, we cannot say anything about the risks associated with serum cholesterol levels; this, of course, is nonsense.

In analyses of these types of problems, regression relationships, e.g., the way dependent variables (death rate in the present instance) depend on predictor variables (fuel economy and other variables here), are specified by regression coefficients. statistical methods are used to estimate the true value of regression coefficients from data, the estimated coefficients are subject to variability. The measure used by statisticians to assess such variability is the estimated standard error of the regression coefficient. When a regression coefficient is at least twice as large as its standard error estimate, the coefficient is called statistically significant. This expression refers to the empirical fact that in the absence of any real relationship between the variables, coefficient estimates at least twice as large as their standard errors would only rarely arise due to chance. The regression coefficient of death rate on fuel economy was statistically significant in this sense.

It is important to under that there are at least two types of uncertainties associated with every regression relationship: uncertainty about overall predictions measured by the standard error of the regression coefficients; and the scatter around prediction errors measured by unexplained variation. These two types of error are typically unrelated in the sense that the size of one implies little about the size of the other.

Table 1 presents results for several regression equations updating that cited in *Status Report*. The present equations are for two-door and four-door 1984-88 model year cars in crashes during 1985-89. (The *Status Report* results were for four-door 1985-87 model year cars in crashes during 1986-88.) As the first of these equations shows, each one-mile-per-gallon increase in fuel economy was associated with about a 5.2 percent overall increase in the death rate. The increase for two-door cars was

slightly more, 5.9 percent, and for four-door cars slightly less, 4.2 percent. In the first equation about 38 percent of the (log scale) death rate variation among two-door and four-door cars was attributed to the two predictors (miles per gallon and body style) that were included in the equation. The present results are comparable in magnitude to those published in *Status Report,* but they indicate an even stronger association between death rates and fuel economy.

Claim 2. Mr. Khazzoom's claim that the relationship between death rate and fuel economy is due to a few outliers is not valid.

Individual data points that exert an exceptionally strong effect on an estimated statistical relationship, such as the regression of death rate on fuel economy, are called outliers by statisticians. Discarding a few outliers may strongly alter estimated statistical relationships. When outliers are present one needs to be careful in the interpretation of results.

One of the standard methods for detecting outliers is Cook's distance (Cook's *d*). This quantity measures how much the regression coefficients are changed by the deletion of individual observations. If the regression equation is correct, all *d*'s are expected to be less than about 1.0. When the *d* of an observation exceeds 1.0, the observation needs to be scrutinized, although it may still not need to be discarded. Mr. Khazzoom's claim that the data set used for the *Status Report* analysis contained outliers is simply not true: The largest among the 47 Cook's *d*'s for this data set was 0.24, which is well within the normal range for correct regressions. Also, as the last column in Table 1 shows, the largest value in each of the updated regressions was also substantially below the 1.0 threshold. Thus, contrary to Mr. Khazzoom's claim, no single observation unduly influenced the estimates for the effect of fuel economy on death rate in any of our regressions.

Mr. Khazzoom also claimed that the *Status Report* result was not robust. In nontechnical language, statistical procedures are described as robust if they work reasonably well even when some of the key assumptions needed for mathematically justifying them are not in fact satisfied. As all statisticians know, least squares regression, the procedure used, is reasonably robust under many conditions. Mr. Khazzoom actually discarded 19 out of 47 observations and then claimed that the result was not robust because his results for the remaining 60 percent of the data were different from those based on the full data set! This is statistical nonsense.

As an additional illustration for the reasonableness of the results, Figures 1 and 2 display observed death rates against predicted death rates, using the first equation in Table 1 for the predictions. These figures also demarcate the region that was expected to contain 95 percent of all observed death rates. In both figures, fewer than the predicted number of observations lie outside the confidence region thus confirming the absence of outliers.

Neither the original analysis in *Status Report* nor the current elaboration were intended to prove that improved fuel economy directly causes higher death rates. Rather, as discussed by Brian O'Neill, IIHS president, at the hearing, fuel economy is indirectly linked to occupant safety by its effect on the exterior size of cars. Because larger cars are heavier than smaller cars and weight directly affects fuel economy, only someone unfamiliar with the basic laws of physics could claim that fuel economy and occupant safety are unrelated. The purpose of the analyses presented here was simply to assess the approximate strength of this indirect effect.

No amount of confused data manipulation can obscure obvious consequences of the basic laws of physics: Fuel economy gains through weight reduction produced by downsizing cars have the unintended side effects of producing less occupant protection and more fatalities.

Table 1

REGRESSION OF (LOGSCALE) DEATH RATE PER 10,000 REGISTRATIONS ON MILES PER GALLON (MPG) AND ON OTHER VARIABLES. TWO- AND FOUR- DOOR 1984-88 MODEL YEAR CARS IN CRASHES DURING 1985-89

DATA	MPG	Body[1] Style	Under Age 30[2]	% MALE[3]	R-SQUARE	MAX (COOK'S d)[4]
All	0.051*	-0.085*	-	-	0.38	0.15
	(0.008)	(0.032)	-	-		
All	0.047*	-0.063	0.002	0.000	0.39	0.33
	(0.010)	(0.039)	(0.002)	(0.005)		
2-Door	0.042*	-	-	-	0.22	0.18
	(0.014)	-	-	-		
2-Door	0.042*	-	0.004	0.004	0.29	0.70
	(0.010)	-	(0.004)	(0.007)		
4-Door	0.057*	-	-	-	0.38	0.34
	(0.010)	-	-	-		
4-Door	0.057*	-	-0.001	-0.002	0.38	0.34
	(0.015)	-	(0.003)	(0.006)		

[1] Body style dummy variable coded as 1/2 for four-door and -1/2 for two-door cars.

[2] Percent of fatally injured occupants in cars driven by drivers under age 30.

[3] Percent of fatally injured occupants in cars driven by male drivers.

[4] Cook's distance (Cook's d) measures how much regression coefficients are changed by the deletion of individual observations. If the regression equation is correct, all d's are expected to be less than about 1.0. Observations need to be closely scrutinized when their d exceeds 1.0. The last column in this table presents the maximum value of the d's over the set of all observations in the regression.

* Indicates statistical significance at 5 percent or better.

Note: Numbers in parenthese are the standard error estimate for the regression coefficient. For statistical significance at the customary 5 percent level, regression coefficient needs to exceed standard error by about a factor of two.

Figure 1
Observed Occupant Death Rates with Upper and Lower 95 Percent Confidence Limits Versus Predicted Occupant Death Rates; 1984-88 Two-Door Cars in Crashes During 1985-89
(Prediction Obtained Using MPG and Body Style)

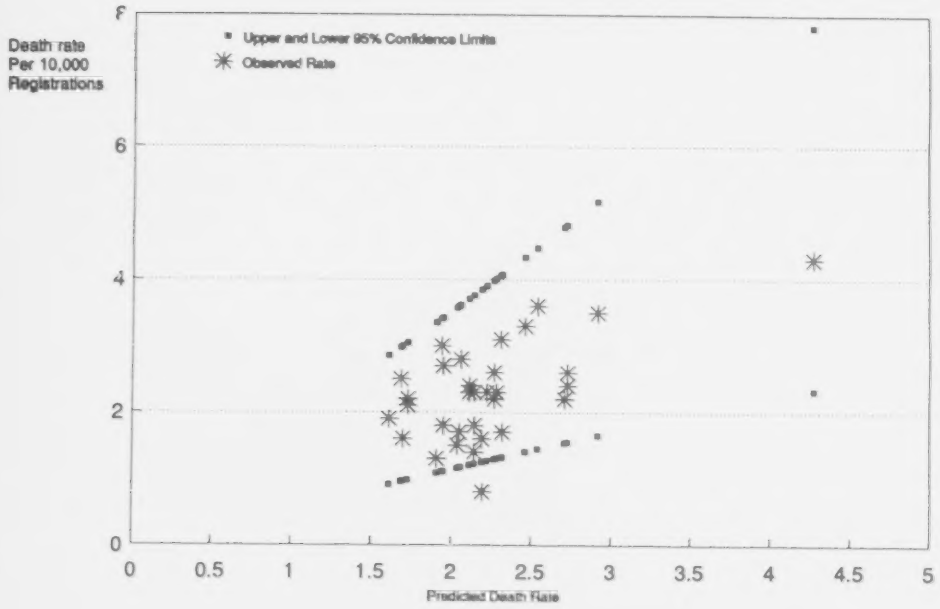
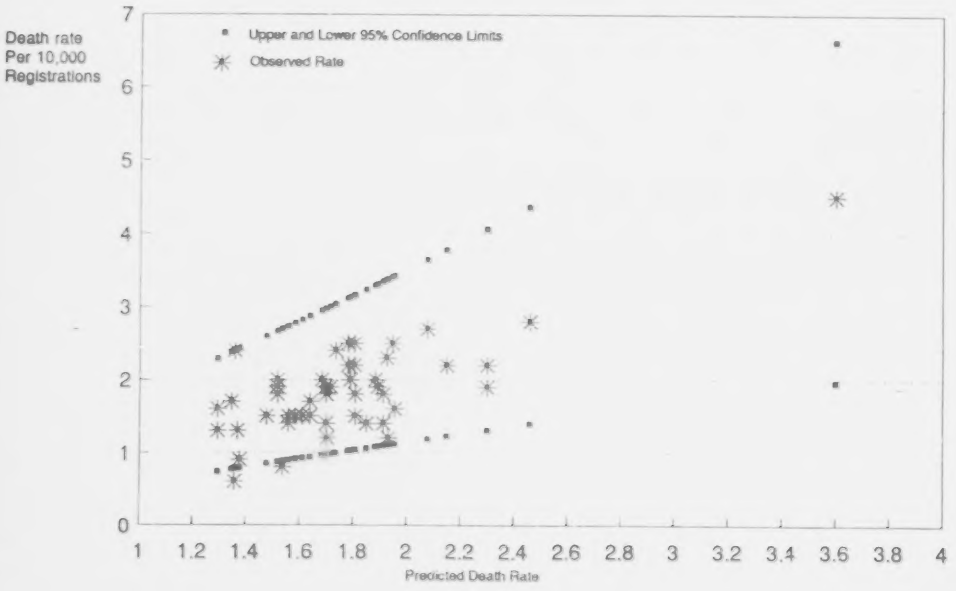


Figure 2
Observed Occupant Death Rates with Upper and Lower 95 Percent Confidence Limits Versus Predicted Occupant Death Rates; 1984-88 Four-Door Cars in Crashes During 1985-89
(Prediction Obtained Using MPG and Body Style)



LETTER FROM JOHN D. GRAHAM, PH.D., DIRECTOR, CENTER FOR RISK ANALYSIS, HARVARD SCHOOL OF PUBLIC HEALTH

MAY 14, 1991.

The Honorable RICHARD H. BRYAN,
U.S. Senate,
Washington, DC 20510

DEAR SENATOR BRYAN: At the April 11 hearings on NHTSA's reauthorization, a witness named J.D. Khazzoom criticized my research with Dr. Robert Crandall (Brookings) on the adverse safety effects of CAFE. I request that this letter, which responds to Mr. Khazzoom's criticisms, be made part of the hearing record.

As you know, the principal finding of our research was that the current CAFE program has caused model year 1989 cars to weigh 500 pounds less than they would have in the absence of CAFE. This 500 pound differential will be associated with 2,000 to 4,000 additional fatalities over the life of the 1989 models.

If new legislation forces fuel efficiency standards to be tightened again, we can expect further downsizing of the vehicle fleet, which will lead to even more fatalities and injuries on the highway. The tighter the deadlines in the new legislation, the more likely it is that manufacturers will resort to downsizing rather than technological improvements to achieve fuel efficiency gains.

Mr. Khazzoom questions the statistical models that we used to make our safety estimates. His criticisms are not new and have already been addressed in the peer-reviewed scientific literature. I shall respond briefly.

1. Mr. Khazzoom argues that our model does not square with reality because we do not find any relationship between highway fatalities and known risk factors such as speed, alcohol, and young drivers.

This criticism is incorrect. In six out of eight cases, the published estimates are in the direction that Mr. Khazzoom expects. Mr. Khazzoom fails to note that other variables in the model have consistently plausible results, such as the effects of trucks, highway design, income, and vehicle weight.

2. Mr. Khazzoom contends that the results for any single variable in the model cannot be trusted because of correlations between other variables in the model.

This criticism is incorrect. Correlations between variables do not generate any bias in the coefficient estimates of a regression model. Such correlations do increase the degree of variability in the coefficient estimates, which is why some of our results do not satisfy conventional tests of statistical significance. Hence, a model does not have to be perfect before a reader should trust the results for a particular variable in the model.

Mr. Khazzoom is correct to urge caution in the interpretation of statistical models. The plausibility of our results is enhanced by the fact that other academic investigators and NHTSA have reached the same conclusions using different methods.

3. Mr. Khazzoom asserts that we have exaggerated the impact of CAFE on the average weight of 1989 models.

The average weight of new cars declined from about 4,000 pounds before CAFE to about 3,000 pounds in 1989. We attribute about half of this decline to CAFE and half to market forces (e.g., higher gasoline prices and changing consumer demands). Mr. Khazzoom offers no better estimate and offers no valid criticism of our estimate.

4. Mr. Khazzoom recommends that any single model, such as the one offered by Crandall and Graham, should not form the basis of public policy.

We concur. We take comfort in the fact that other investigators have reached the same findings that we have. We encourage other investigators, including Mr. Khazzoom, to contribute original research on this question to the peer-reviewed scientific literature.

5. Mr. Khazzoom argues that if CAFE does kill, one should logically repeal the gas tax increase.

This statement is incorrect. We should be looking for public policies that both save lives and save energy. Examples include expansion of mass transit and enforcement of speed limits. Higher gasoline taxes are also a sound safety policy because they reduce discretionary driving that is disproportionately associated with highway fatalities. Our recent article in The American Enterprise (enclosed) makes the case that gasoline taxes are a better policy option than CAFE because they promise to save more energy while curbing the highway death toll.

Let me conclude by concurring with Mr. Khazzoom that the purported benefits of CAFE—such as reduced vulnerability to oil imports and less global climate risk—

should also be considered by policy makers. Our view is that tighter CAFE standards are an inefficient and unsafe means to achieving these ends.

Sincerely,

JOHN D. GRAHAM, Ph.D.,
Director.

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